ANTARCTIC MAPPING MISSION PLANNING AIDS

BYRD POLAR RESEARCH CENTER

THE OHIO STATE UNIVERSITY

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A special acknowledgement to Carrie Dratwa and Braden Love

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Section 1: RADARSAT: The Antarctic Mapping Project

Dr. Kenneth C. Jezek

1.0 Introduction

On November 4, 1995, the Canadian RADARSAT was carried aloft by a NASA rocket launched from Vandenburg Air Force Base. Radarsat is equipped with a C-band Synthetic Aperture Radar (SAR) capable of acquiring high resolution (25 m) images of Earth's surface day or night and under all weather conditions. Along with the attributes familiar to researchers working with SAR data from the European Space Agency's Earth Remote Sensing Satellite and the Japanese Earth Resources Satellite, RADARSAT will have enhanced flexibility to collect data using a variety of swath widths, incidence angles and resolutions. Most importantly, for scientists interested in Antarctica, the agreement for a U.S. launch of RADARSAT includes a provision for rotating in orbit the normally right-looking SAR to a left-looking mode. This 'Antarctic Mode' will provide for the first time a nearly instantaneous, high resolution view of the entirety of Antarctica on each of two proposed mappings separated by 2 years. This is an unprecedented opportunity to finish mapping one of the few remaining uncharted regions of the Earth. The completed maps will also provide two important benchmarks for gauging changes of Antarctica's ice cover.

The preparation of a digital mosaic of Antarctica is being conducted under a NASA Pathfinder Project awarded to the Byrd Polar Research Center of The Ohio State University. The primary goal of this proposal is to compile digital SAR mosaics of the entire Antarctic continent using a combination of standard and extended beams during the "Antarctic Mode" of the Radarsat Mission. Agreements with the Canadian Space Agency call for the first Antarctic Mapping Manuever to occur in September, 1997. A mission plan to coordinate that complex acquisition and downlinking of Antarctic data has been developed by NASA's Jet Propulsion Laboratory. The Alaska SAR Facility (ASF) will be used as the primary data collection site supported by collections at the Canadian Gatineau and Prince Albert Ground Stations. ASF will process data into images which will be sent to OSU for compositing into map products using state-of-the-art equipment to be designed by Vexcel Corporation of Boulder Colorado. Imaging geometry will be constrained over the Antarctic using active radar transponders constructed by the

Environmental Research Institute of Michigan and by corner reflectors deployed by the British Antarctic Survey. Additional ground control is being supplied by the National Imagery and Mapping Agency. Final products will be distributed through the ASF and the National Snow and Ice Data Center which are both NASA Data Archive Centers. The mosaics and ancillary information will be prepared on CDROM and will be made available to the science community through NASA DAACs.

Science opportunities envisioned for the program are summarized on the accompanying table. These include studying the dyamics and variability of the Antarctic Ice Sheet including studies of regions like the Wordie Ice Shelf and the Larsen Ice Shelf which have recently experienced unexplained and nearly catastropic retreat. Geologic applications include large scale mapping of faults, volcanic features, and mountain building processes (particularly the Transantarctic Mountains. Finally, there is simply the unprecedented opportunity to use these digital maps in studies of many previously unexplored areas of the Southern Continent.

1.1 Science Opportunities

1.1.1 Glaciology

- Ice sheet/stream flow regimes (fast glacier flow, relict features, outlet glaciers
- Stability of West Antarctic Ice Sheet (grounding lines, surface velocities)
- Ice sheet mass balance (calving rates, ice sheet margins, topography)

  Surface melt regimes

1.1.2 Geology

- Uplift of the Transantarctic Mountains (Fault and lineament mapping)
- History of subduction beneath the Antarctic Peninsula
- Geologic mapping (Sirius Formation)
- Vulcanology

1.1.3 Geomorphology

- History of glaciation (moraines, raised beaches)

1.2 RAMP AIC Replanning Rules

1) Minimize impact on the remaining mission
2) Choose simplest approach that most quickly achieves mission objective of complete coverage.

1.3 Priority Orders

1.3.1 Imaging Categories: Priority Order

1) Acquire all mapping data between 78 degrees South Latitude to the South Pole.

2) Acquire layover fill data between 78 degrees South Latitude to the South Pole

3) Acquire all ascending mapping data

4) Acquire all layover fill data

5) Acquire EH-4 South Pole to Coastline spokes

6) Acquire South Pole Transponder data

7) Acquire McMurdo Station Transponder data

1.3.2 OBR Categories: Priority Order

1) Lower OBR priority increases probability of real-time downlink

2) OBR for all mapping data between 78 degrees South Latitude to the South Pole.

3) OBR for all ascending mapping data

4) OBR for all layover fill data between 78 degrees South Latitude to the South Pole

5) OBR for remaining layover fill data

6) OBR for South Pole Transponder data

7) OBR for McMurdo Transponder data

1.3.3 Geographic Categories: Priority Order

REGIONS BETWEEN 78 Degrees South and the South Pole
Gould Coast
Siple Coast
Shirase Coast
Rockefeller Plateau
Marie Byrd Land
Hollick Kenyon Plateau
TransAntarctic Mountains and East Antarctic Outlet Glaciers
Ellsworth Mountains
Ross Ice Shelf
Filchner Ronne Ice Shelf
Shackelton Range
South Pole Station

REGIONS NORTH of 78 Degrees South Latitude
Graham Land
Palmer Land
Queen Maud Land
Transantarctic Mountains
Lambert Glacier and Amery Ice Shelf
Vostok
Dome C
Pine Island Bay and Bakutis Coast
Wilkes Land

1.3.4 AIC Beam Priorities

1) Standard beam 2 has highest priority for mapping coastal and interior regions.

2) Standard beam 1 is the primary backup for standard beam 2

3) Standard beam 3 is the secondary backup for standard beam 2

4) ST2, 3, 4, 5, 6,7 will be used to map successively southerly latitudes. EH4 will be used to repeatedly image the South Pole.

5) Mapping data should be acquired in ascending mode. Descending mode should only be used as a contingency.

6) ST7 and Descending ST2 should be used for layover fill

1.3.5 Priorities by Time into the Mission

1) Acquire all data collections within the Pole Hole during the first 7 days;

2) Acquire as much data outside the Pole Hole as early in the mission as possible, especially data collections that require long swaths;

3) Acquisitions late in the mission are downlinked to ASF.

1.4 Contingency Scenario for Data Lost Late in the Mission

We assume that one of the last planned data acquisitionsis lost and that those data would have been down-linked to Prince Albert or Gatineau. We assume that it takes 48 (possibly 72) hours to transport data from PA and/or GAT to ASF. We assume 1 day to scan, error detect and replan at ASF. We understand CSA will require 3 days to reprogram the satellite. We can reacquire data anywhere over the continent within 3 days using one of the 7 standard beams. If we limit data collections to only standard beam 2, we reaquire another complete cycle to reacquire data.

Action	**Hours**
Data Acquisition	0
Delivery at ASF	48
Error Detection and Replanning	72
Reprogram Satellite	144
Reacquire data	*216

*this time could be reduced depending on the position of the satellite at the time it is reprogrammed.

Hence a maximum of 10 days beyond the optimal mission are necessary to account for all contingencies in this scenario. 7 days of extended mission are required if the data are lost during downlinking to ASF.

1.5 AIC Information Flow

Description	Source (individual and organization)	Destination (individual and organization)	Method
Acquisition Schedules (ASF,MGS)	CSA	ASF	
MGS Acquisition Schedule	ASF	MGS	
Acquisition Schedules	CSA	GSS	
Acquisition Schedules	CSA	PSS	
Post Acquisition Reports	ASF	CSA	
Post Acquisition Reports	PSS	CSA	
Post Acquisition Reports	GSS	CSA	
Post Acquisition Reports	MGS	ASF	
DQM Files	MGS	ASF	email
Electronic copy of data	PSS	GSS	ANIK Link
Copy of GSS/PSS data	GSS	ASF	Fedex
JPEG Image of Coast data	GSS	ASF	ftp
FastScan catalogue data	GSS	ASF	ftp
SRFs	ASF	BPRC	ftp
SRFs	ASF	CSA	ftp
Lo-res image data	ASF	BPRC	ftp
Lo-res image data	ASF	CSA	ftp
bit error rate summary	GSS	ASF	
bit error rate summary	PSS	ASF	
bit error rate summary all data	ASF	CSA	
South Pole Xponder performance	CDPF	ASF/CSA	reports
South Pole and McMurdo Xponder	ASF	CDPF/CSA	performance reports
Coverage Maps	ASF	CSA	ftp (SPA)
Sliver Validation reports	ASF	CSA	ftp
Minutes of verified processable	ASF	CSA	SAR data
Minutes of verified processable	ASF	CSA	pole hole data
Blank tapes	ASF	PSS	
Blank tapes	ASF	GSS	

1.6 Data Descriptions for Use in Verifying Coverage

September 3, 1997

Data Type	Swath Width	Swath Length	Ephemeris	Accuracy	Available after Acquisition
SRF ST1-7 EH-4	 102 Km 90 Km	SRFs longer than image data (1 sec or 7 km added to beginning and end)	Predicted	1 KM along 50 m across (Ephemeris accurate to 140 m along and 20-30 m across)	12 hours
Final SRF	102 Km	Same QLK SRF	Restituted		48 hours min
AIC SPA ST1-7	 102.4 KM	may or may not include processor pad	Nominal	+- 5 km across track	Pre-AIC
AIC SPA EH-4	90.3	may or may not include processor pad	nominal		Pre-AIC
MMO		includes downlink, OBR and processor pads	Predicted along track; nominal across track		Pre-AIC
ASP QL Image AIC ST1-7	102.4KM measured from near range point		Predicted	600 m across track,5 Km along track	12 hours
PP Image AIC ST1 ST2 ST3 ST4 ST5 ST6 ST7 EH4	 108.3 107.9 109.8 108.2 108.3 108.3 104.4 89.5	102.4 Km per frame	Predicted		
FastScan Image	102 Km (Min)			120/120 m (GSS report)	
CUF	102 km (min)	102 km	broadcast		1 hour
PP Image Post AIC	See above		Restituted		

1.7 Mission Planning and Replanning Coverage Map (July 26, 1997)

<u>RAMP Goal</u>

Complete Antarctic Coverage (Mapping and Layover Fill) in 18 days

Map Requirement	For Approving Mission Plan	For verifying Mission Success
All Mapping Data; RTM and OBR; 18 days	Essential	Essential
All Layover Data; RTM and OBR; 18 days	Essential	Essential

1.8 RAMP Mission Planning Objectives

1) OBR of all mapping and layover data to GSS/PASS/ASF
2) Pole Hole (between 78 S and Pole) Covered in first 100 orbits
3) Spokes acquired for geometric calibration
4) Calibration data

Map Requirement	For Approving Mission Plan	For verifying Mission Success
1) All mapping data; OBR; 18 days	important	important
1) All Layover data; OBR; 18 days	important	important
2) All mapping data; OBR and RTM; first 100	important	essential (in the event of early cancellation
2) All layover data; OBR and RTM; first 100	important	essential (in the event of early cancellation)
3) Spoke data; OBR and RTM	important	useful
4) Calibration data; OBR and RTM	important	useful

note: Maps should show a conservative estimate of effective image coverage (no padding).

1.9 AMM SCIENCE TEAM

1.9.1 ASF AMM Science Team

Monitor the progress of the mission, verify compliance with the mission plan and provide progress reports to CSA Team. In the case of anomalies (other than spacecraft or ground receiving station operational problems) provide CSA team information for replanning. Reassess any replanned acquisitions in the context of science requirements.

1.9.2 CSA AMM Science Team

Concur on nominal mission plans. Provide scientific guidance for replanning activities including replanning rules and mission success criteria. Provide science justification for replanning requests. Concur on replanning requests. Serve as scientific liaison to CSA and NASA. Provide information to ASF Science Team about replanning requests.

1.9.3 PSS/GSS/OSU AMM Science Support

Data Quality reports. FTP FastScan data products. FedEx Data Tapes. Progressreports to AMAG

1.10 AMM Science Team Functions and Products

- Mission Progress Checklist (ASF ST)
- Along-track data gap checking and reporting (ASF ST)
- Across-track, quick-look sliver checking and reporting (ASF ST)
- FastScan data quality assessments (ASF ST, GSS/PSS SS)
- FedEx Data Tapes to ASF (GSS/PSS SS)
- Create official coverage maps (daily/cumulative) (ASF ST)
- Prioritize replanning activities (CSA ST)
- Replanning aids (coverage maps) (CSA ST)
- Mission Coverage Report to AMAG via Web (OSU SS)
- Configuration Control (JPL)

1.11 Science Team Members

ASF ST	CSA ST	PSS SS	GSS SS	OSU SS
Frank Carsey (JPL)	Ken Jezek (OSU)	Biyan Li (OSU)	Katy Noltimier (OSU)	Ada Chan
Rick Forster (OSU)				Carrie Dratwa
Vance Herron (JPL)				Hongxing Liu
Ben Holt (JPL)				Braden Love
Verne Kaupp (ASF)				Hong Gyoo Sohn
Nettie LaBelle-Hammer (ASF)				Victor Zhilstov
Jeanne Nason (ASF)				
Kevin Engel (ASF)				

1.12 AMM Mission Planning and Replanning Team

Prepare Nominal Mission plans. Prepare early/late start contingency strategies. Conduct replanning for spacecraft and data quality anomalies.

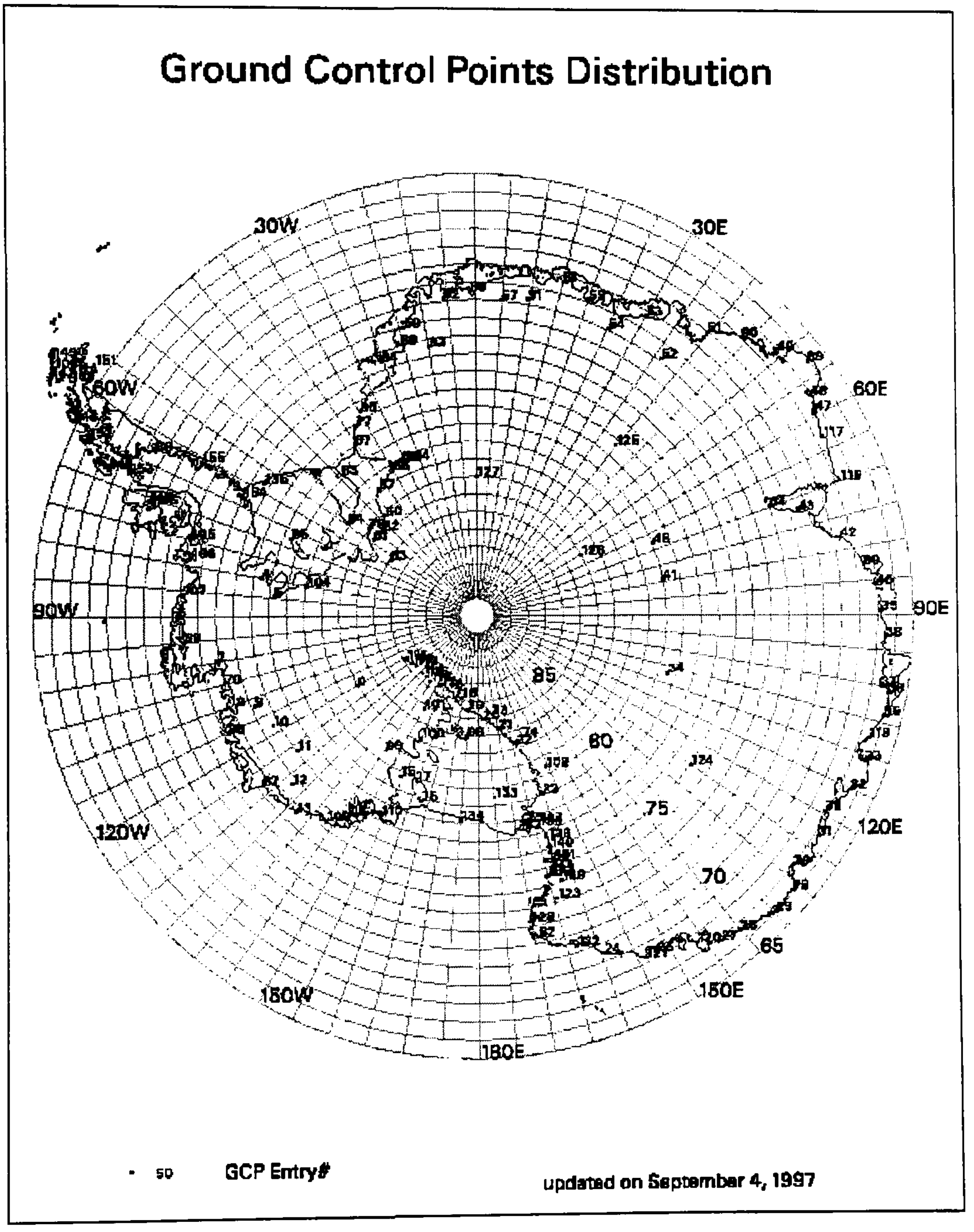
1.13 AMM Mission Planning and Replanning Team Members

- Rick Austin (JPL)
- John Crawford (JPL)
- Rejean Michaud (CSA)
- Ellen O'Leary (JPL)
- Stefanie Ruel (CSA)
- Tammy Veijos (JPL)

Section 2: GCP Coverage

Biyan Li

2.0 Ground Control Point Distribution



2.1 GCP Attribute

Entry#	order#	Major Feature name	Latitude	Longitude	Source
25	S1-1	McMurdo Station, ARC Site, USA	-77.849550	166.730383	usgs fig31/station map d11/McM. Sound Area d3
2	S1-2	Anvers Island, Palmer Station, USA	-64.766667	-64.050000	palmer station map d11/compare s9-2
33	S1-3	Casey Station, Australia	-66.300000	110.533333	AFIM/Australian Quadrant E2-66-10
51	S1-4	Syowa Station, Japan	-69.000000	39.583333	usgs fig59,Ongul Islands d8,Lutzow-Holm Bay d9
28	S1-5	Dumont d'Urville Station, French	-66.666667	140.016667	AFIM/station map d11
34	S1-6	Vostok Station, Buried Towers, Russian	-78.466667	106.816667	AFIM
9	S1-7	Mount Takahe, Volcano	-76.216667	-112.000000	usgs fig94-95/Mt. Takahe d2
42	S1-8	Davis Site, Australia	-68.600000	77.966667	usgs fig50/Vestfold Hills d11/AFIM
1	S2-1	Deception Island, Collins Point, Lighthouse	-62.998600	-60.591500	South Shetland Islands d13
3	S2-2	Wilkins Ice Shelf, Dorsey Island	-70.375000	-71.875000	usgs fig#87
4	S2-3	Fowler Ice Rise, near Carlson Inlet	-77.431034	-80.000000	usgs fig#89/Ellesworth mt d3
5	S2-4	Sentinel Range, Rutford Ice Stream, ATLAS	-78.281818	-84.459016	usgs fig#90,91/Newcomer Glacier and Vinson Massif d2
6	S2-5	Islands, no ID	-72.922662	-90.000000	Thuston Island-Jones Mt. d4
7	S2-6	Pine Island Glacier, Shepherd Dome - Webber Nunatak.	-74.872779	-99.730560	usgs fig#92/Thuston Island-Jones Mt. d4
8	S2-7	Mount Murphy, near Thwaites Glacier	-75.254545	-110.374468	usgs fig#93/Mt. Murphy d2
10	S2-8	Crary Mountains	-76.679211	-118.000000	usgs fig#94f/Crary Mt d2,Bakutis Coast d4
11	S2-9	Mount Hampton, Waesche	-77.071429	-126.485743	usgs fig#97,94/Mt. Hampton d2, Mt. Sidley d2
12	S2-10	Ames Range, Mount Kauffman	-75.650442	-132.000000	usgs fig#94c/Mt. Kosciusko d2
13	S2-11	Russkaya Station, Lynch Point	-74.672897	-136.897338	usgs fig#98/Cape Burks d2
14	S2-12	Rangle Glacier, near Mitchell Peak, Coastline	-76.432292	-147.333333	usgs fig#100/Guest Peninsula d2
15	S2-13	Ice Rumples, Ross Ice Shelf, Shirase Coast Line	-79.741379	-154.000000	usgs fig#102/ST 5-8/13 d3
16	S2-14	Amundsen Glacier, MacDonald Nuataks	-85.450000	-157.657200	usgs fig#15/Mt. Goodale d2
17	S2-15	Roosevelt Island	-79.890909	-159.310345	ADD data
0	S2-16	Byrd Surface Camp	-82.000000	-120.000000	AFIM/ADD
18	S2-17	Liv Glacier, Aviator Nunatak	-85.178000	-168.970500	usgs fig#17/Liv Glacier d2
19	S2-18	Shacketon Glacier,Nilsen Pk	-84.534160	-174.023880	usgs fig#18/Shacketon Glacier d2
20	S2-19	Mount Kaplan, coastline point	-84.000000	176.850746	usgs fig#19/The Cloudmaker d2
21	S2-20	Beardmore Glacier, McCann Pt.	-83.375000	169.627400	usgs fig#20/Mt. Elizabeth d2
22	S2-21	Nimrod Glacier, coastline pt.	-82.250000	163.448276	usgs fig#21/Nimrod Glacier d2
23	S2-22	Mulock Glacier, across from Cape Teal	-79.114537	160.000000	usgs fig#26
24	S2-23	Leningradskaya Station	-69.500000	159.400000	usgs fig#43/Suvorov Glacier d2
26	S2-24	Cook Ice Shelf	-68.318564	151.792619	
27	S2-25	Cape Denison, Commonwealth Bay	-66.883784	143.000000	usgs fig#44
38	S2-26	Mirnyy Station	-66.550000	93.016667	usgs fig#48/
29	S3-1	Wilkes Land Coastline, Lewis Islet	-66.075800	134.617550	Australian Quadrant E2-66-7 d4
30	S3-2	Wilkes Land Coastline, South of Cape Pt, De Haven	-67.000000	128.275000	Australian Quadrant E2-66-7 d4
31	S3-3	Wilkes Land Coastline, Intersection of Land and Ice Shelf	-66.800000	123.000000	Australian Quadrant E2-66-8 d4
32	S3-4	Cape Waldron, near Cape Hmmersiy and Totten Glacier	-66.435000	115.000000	usgs fig#46/Australian Quadrant E2-66-9 d4
35	S3-5	Wilkes Land Coast, Near Bunger Hills and Shackelton IS.	-66.000000	104.000000	usgs fig#47/Australian Quadrant E2-66-10 d4
36	S3-6	Oazis Station, near station and Thomas Island Central Pt.	-66.062500	100.750000	usgs fig#47/Australian Quadrant E2-66-11 d4
37	S3-7	Denman Glacier, Adjacent to	-66.500000	100.000000	usgs fig#47/Australian Quadrant E2-66-11 d4
39	S3-8	Gaussberg Site	-66.799000	89.314000	African Quadrant E1-66-12 d4
40	S3-9	West Ice Sheet, Near Junction of Large and Small Island	-67.000000	85.704434	African Quadrant E1-66-12 d4
41	S3-10	Gambertsev Subglacial Mountains	-79.000000	79.135338	usgs fig#49
43	S3-11	Gillock Island	-70.495496	72.099303	
44	S3-12	Lambert Glacier, Robertson Nunatak	-71.932127	69.808874	usgs fig#53
45	S3-13	High Plateau	-78.945813	68.000000	usgs fig#51
47	S3-14	Cape Wilkens, Glacier is nearby	-67.250000	59.115000	African Quadrant E1-66-8 d4
48	S3-15	Kvarsnes Foreland	-67.053600	56.965600	African Quadrant E1-66-8 d4
49	S3-16	Enderby Land	-67.000000	49.000000	usgs fig#57
52	S3-17	Mt Deronm, Queen Fabiola Mnts,Motoi Nunatak	-71.788000	36.207000	usgs fig#60/Motoi Nunatak d8
53	S3-18	Princess Raghild Coastline at Shelf	-70.273973	30.000000	East Queen Maud Land-Enderby Land d9
54	S3-19	Sor Rondane Mts, Isolated Rock	-71.875000	25.233300	usgs fig#61/Menipa d8
55	S3-20	Princess Raghild Coastline at Shelf	-70.800000	20.000000	East Queen Maud Land-Enderby Land d9
57	S3-21	Jutulstraumen Glacier, Hamaroya Rock or Island Center	-71.933000	4.949900	usgs fig#68/Muhlig Hofmannfjella Nord d7
58	S3-22	Jutulstraumen Glacier, Between Utkilikken and Glacier	-71.520600	-0.938423	usgs fig#68/AhlmaNurgGen d7
59	S3-23	Cape Norwegen 4 Site, J. Glacier	-73.062500	-14.000000	usgs fig#68/Vestfjella Aust. d7
60	S4-1	Argentina Range, Giro Nunatak	-82.221000	-42.250000	Argentina Range d2
61	S4-2	Cordiner Peaks, BRown Nunataks North	-82.609000	-53.561000	Cordiner Peaks d2
62	S4-3	Davis Valley, Ackerman Nunatak	-82.681700	-47.732200	Davis Valley d2
63	S4-4	Gambacorta Peak, Mt Harper SW Part	-84.061300	-57.076900	Gambacorta Peak d2
64	S4-5	Shackleton Range, Meade Nunatak	-80.372800	-21.959400	Shackleton Range d2
65	S4-6	Shackleton Range, Mount Sheffield	-80.121700	-25.736900	Shackleton Range d2
66	S4-7	Shackleton Range, Mount Provende	-80.380600	-29.959400	Shackleton Range d2
67	S4-8	Shackleton Range, Moltke Nunataks	-77.952800	-35.474200	Sheet W77 32/34 d13
68	S4-9	Vestfjella Vest, Audunfjellet	-73.922800	-15.590000	Vestfjella Vest d7
69	S5-1	Thurston Island - Jones Mountains, Coastline Pt	-73.228175	-95.000000	Thurston Island-Jones Mt. d4

Entry#	order#	Major Feature name	Latitude	Longitude	Source
70	S5-2	Thurston Island - Jones Mountains, Coastline Pt	-75	-104.923077	Thurston Island-Jones Mt. d4
71	S5-3	Amundsen Glacier, Terrain-Glacier Interface	-85.0611588	-164	Mt. Goodale d2
72	S5-4	Amundsen Glacier, Terrain-Glacier Interface	-85.42932489	-152	Mt. Goodale d2
73	S5-5	Mount Kaplan Area, Mt Patrick Peak	-84.213611	171.752777	Mt. Kathleen d2
74	S5-6	Nimrod Glacier, Kon_Tiki Nunatak	-82.551666	159.8947	Nimrod Glacier d2
75	S5-7	Roosevelt Island, Most Northern Point	-78.86383	-162.8599	ADD
76	S5-8	Davis Valley, Coastline Feature	-82	-51.0740741	Davis Valley d2
77	S5-9	North of Moltke Nunataks on Terrain Glacier Boundary	-77.125	-32.5811518	Sheet W77 32/34
78	S5-10	Australian Quandrant E2-66-7, Coastline Pt.	-66.18274112	131	Australian Quadrant E2-66-7 d4
79	S5-11	Australian Quandrant E2-66-9, Coastline Pt.	-67.14583333	119.3670886	Australian Quadrant E2-66-7 d4
80	S5-12	African Quandrant E2-66-12, Coastline Pt.	-67.59615385	82.5959596	African Quadrant E2-66-9 d4
81	S5-13	East Maud Land, Enderby Land, Coastline Pt	-70.26785714	15	East Queen Maud Land-Enderby Land d9
82	S6-1	Flat Island Near Robertson Bay	-71.3953	169.275	Cape Adare d2
89	S6-8	Simmer Peak,African Quadrant E1-66-8	-66.0847	52.7806	African Quadrant E1-66-8
90	S6-9	Ryugu_Kita Pt, Prince Olay Coast Map	-67.9667	44.05	Prince Olay Coast d9
91	S6-10	Sandneshatten, Humboldtejella Map	-71.7	9.599	Humboldtejella d7
92	S6-11	Forstefjell, Gleverryggen Map	-71.8333	-5.75	Gleverryggen d7
93	S6-12	Hansson, Heimefrontfjella Nord Map	-74.4155	-9.8333	Heimefrontejella Nord d7
94	S6-13	Lydden Ice Rise Cove, North of 82S Map	-74.5	-20.5	N. of 82s d14
95	S6-14	Vhogbom Outcrops, Shackleton Range Map	-80.25	-24.853	Shackleton Range d2
96	S6-15	Luitpold Coast, Cove, North of 82 S Map	-76.539	-29.687	N. of 82s d14
97	S6-16	Filchner Ice Shelf and Coast Line, North of 82 S Map	-80 8	-37.746	N. of 82s d14
104	S6-23	Fusco Nunatak, Hercules Inlet, Liberty Hills	-80.0269	-80.139	Liberty Hills d2
105	S6-24	Spaatz Island Cove, Southern Palmeland	-73.1044	-74.875	Southern Palmerland and Eastern Ellsworth Land d14
106	S6-25	Island Center Point, Bryan Coast - Ellsworth	-73.3422	-78.342	Bryan Coast -Ellsworth Land d4
107	S6-26	Allison Peninsula, Cove, Bryan Coast-Ellsworth	-73.1408	-85.764	Bryan Coast -Ellsworth Land d4
109	S6-28	Burnetts Rock, Grovews Island, Mount McCoy	-75.393	-143.21	Mt. McCoy d2
110	S6-29	Sneddon Nunatak, Alexandra Mountains Map	-77.2727	-153.75	Alexandra Mt. d2
111	S6-30	Noble Nunatak, Long Hill Map	-85.2208	-121.45	Long Hills d2
112	S6-31	Spiers Nunatak, Wisconsin Range Map	-85.3378	-125.81	Wisconsin Range d2
113	S6-32	McCrilles Nunatak, Davisvill Glacier, Wisconsin Rnage	-85.4431	-128.93	Wisconsin Range d2
114	S6-33	Cohen Nunatak, Reedy Glacier, Leveret Glacier	-85.4022	-136.2	Leverett Glacier d2
115	S6-34	Rock, Bender Mountains, Leverett Glacier M	-85.4317	-139.92	Leverett Glacier d2
116	S6-35	Fallone Nunataks, Leverett Glacier Map	-85.3244	-143.81	Leverett Glacier d2
83	S7-1	Berkner Island, near Belgrano III	-78.79	-43.77	Filchner-ronne Schelfers d7
84	S7-2	Berkner Island, Southern Tip	-80.84	-54.27	Filchner Ronne Schelfers d7
85	S7-3	Korff Ice Rise	-78.46	-67.32	Filchner Ronne Schelfers d7
86	S7-4	Briesemeister Peak near Hearst Inlet	-69.509	-62.801	Palmer Land d4
87	S7-5	Mt. Siple/Dean Island	-74.31	-128.09	Dean Island d2
88	S7-6	Wright Island	-74.24	-115 03	Martin Peninsula d2
98	S7-7	Crary Ice Rise	-83	-175	not found
99	S7-8	Southern Margin of Ice Stream D	-80.64	-145.5	SU6-10/1 d3
100	S7-9	Ice Stream C	-82.2	-155	not found
101	S7-10	Ice Stream B Snake	-83.8	-150	not found
102	S7-11	Byrd Glacier	-80.45	155.9	Mt Olympus d2
103	S7-12	Terra Nova,Italian Station	-74.695	164.114	
108	S7-13	Cape Roberts	-62.5	-59.5	Location is about 77 S and 162.5 E.
117	S7-14	Mawson, Australlian Station	-67.6	62.86666667	Location obtained from Station location data base
118	S7-15	Cape Davaley	-67.7	69.7	ADD coastline coast03
119	S7-16	Rcist Rock	-66.5311	107.4158	typo
120	S7-17	Fisher Bay,Metz Glacier Island	-67.58	146 02	ADD coastline
121	S7-18	Cape Hudson	-68.29	153.84	ADD coastline
122	S7-19	Sputnik Island, Smaller Island	-70.396	163 36	
123	S7-20	Mnt. Supernal, Navigator Nunatak	-73.268	164.258	
124	S7-21	Dome C	-75	125	not found
125	S7-22	Dome Fuji	-77.317	39.7	Scar Bulletin
126	S7-23	Unidentified Feature	-83	60	not found
127	S7-24	Unidentified Feature	-82	0	not found
128	S7-25	Mt. Riddols, Cape Hallet	-72.319	170.211	
129	S7-26	Timber Peak, LOCATION	-74.17	162.39	Mt Melbourn d2
130	S7-27	Drydalski Ice Tongue, D-ice Tip	-75.42	164.35	Relief Inlet d2
131	S7-28	Drydalski Ice Tongue, D-ice Back	-75.41	162.57	relief inlet d2
132	S7-29	Cape Chrozier	-77.5	169.32	Ross Island d2
133	S7-30	Ross Ice Shelf Rock	-79.5	174.75	Mcmurdo Sound d2
134	S7-31	Ross Ice Shelf	-78.2	-175	not found
135	S7-32	Ronne Ice Shelf	-75.64	-58.09	Filchner-ronne Schelfers d7
154	S7-33	Cape Adams on Bowman Peninsula	-74.991	-62.991	Ellsworth land-palmer land d4
155	S7-34	Cape Darlington near Hilton Inlet	-72.009	-60.853	Palmer Land d4

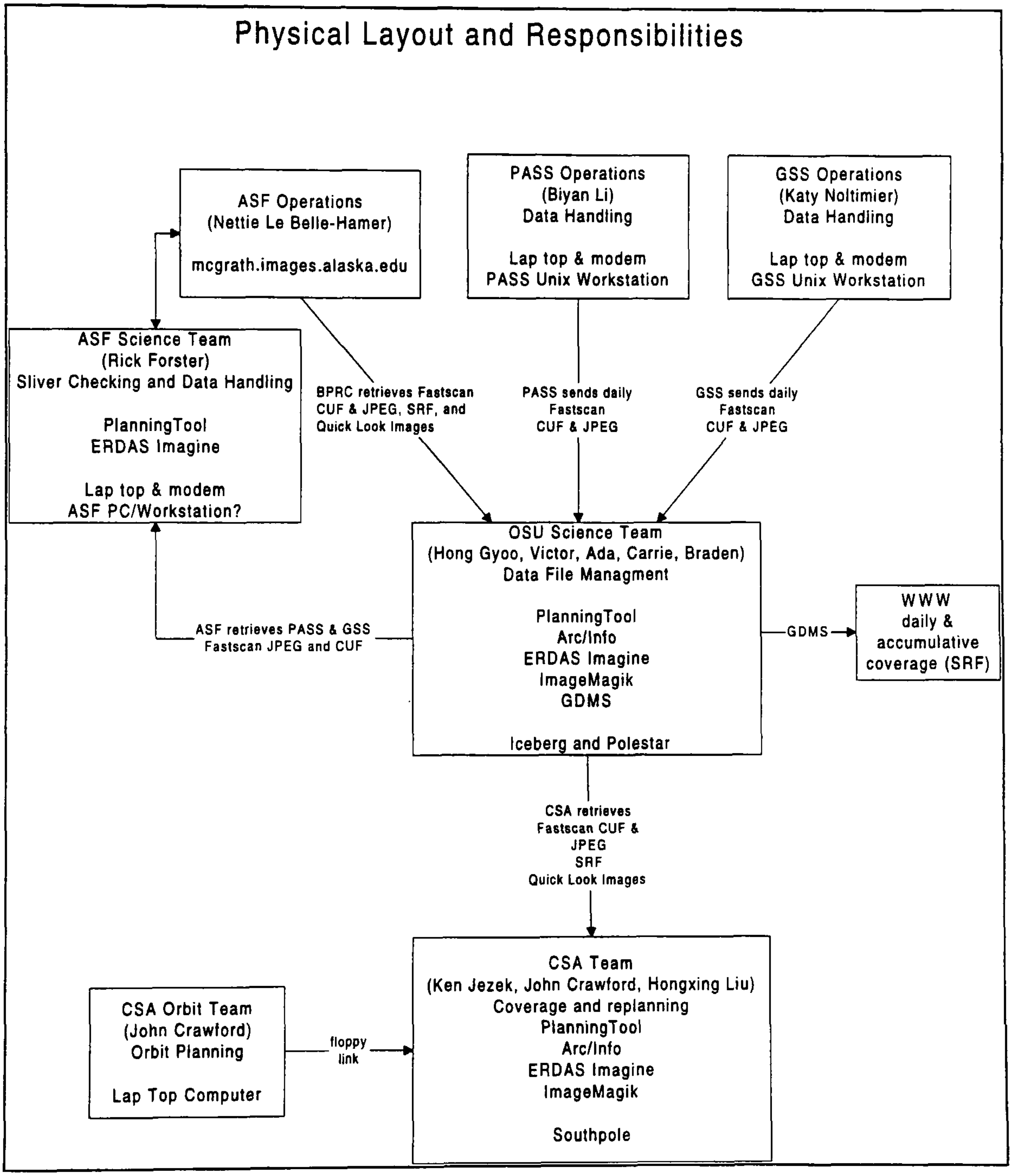
Entry#	order#	Major Feature name	Latitude	Longitude		Source
136	S8-2	Marble Point	-77 4325	163.8209		Berkman's GPS and Marble Point in d1
137	S8-3	Explores Cove Drill Stem	-77.5773	163.5182		Berkman's GPS and Lake Fryxell in d1
138	S8-5	Markhan Island	-74 5946	164.9237		Mount Melboure in d2
139	S8-6	Tripp Island	-76.6396	162.701		Franklin Island in d2
140	S8-9	Cape Hickey	-76.0923	162.6308		Franklin Island d2
141	S8-10	Cape Rusell, Scott Expedition	-74.9008	163.9052		Mount Melbourne d2
142	S9-1	Hannah Point on Livingston	-62.650277	-60.621111		South Shetland Island, sheet w62 60 d13
143	S9-2	Palmer Station, Tip	-64.7766	-64.0595		Palmer station map d11
144	S9-3	Torgersen Island, Peak	-64.7723	-64.088		Anvers Island S. Coast W. Sheet d12
145	S9-4	Exile Nunatak	-70.54444	-70.8725		Colbert Mt. Alexand Island Sr19-20/9 d12
146	S9-5	Merger Island, Nunatak	-70.2751	-70.702		Colbert Mt Alexand Island Sr19-20/9 d12
147	S9-6	Lab Building Center	-67.5708	-68.1294		Station map of Rothera d11
148	S9-7	North End of Runway	-67.5637	-68.1234		Station map of Rothera d11
149	S9-8	Arctowski Station, Center of T-shaped Building	-62.1561	-58 4697		Admiralty Bay d11, South Shetland Island w62 58 d13
150	S9-9	Zigzag Island Center	-63.6159	-59.8316		Trinity Peninsula d12
151	S9-10	Radio Towers Near Runway	-64.2396	-56.6252		Seymour Island-Isla Marambio d1
152	S9-11	Larrouy Island, Peak	-65.8533	-65.2588		Falkland Island dep;.-Granham Land w65 64/d13
153	S9-12	Alamode Islands	-68.7179	-67.5		Marguerite Bay-Graham Land in d12

Section 3: Physical Layout and Responsibilities

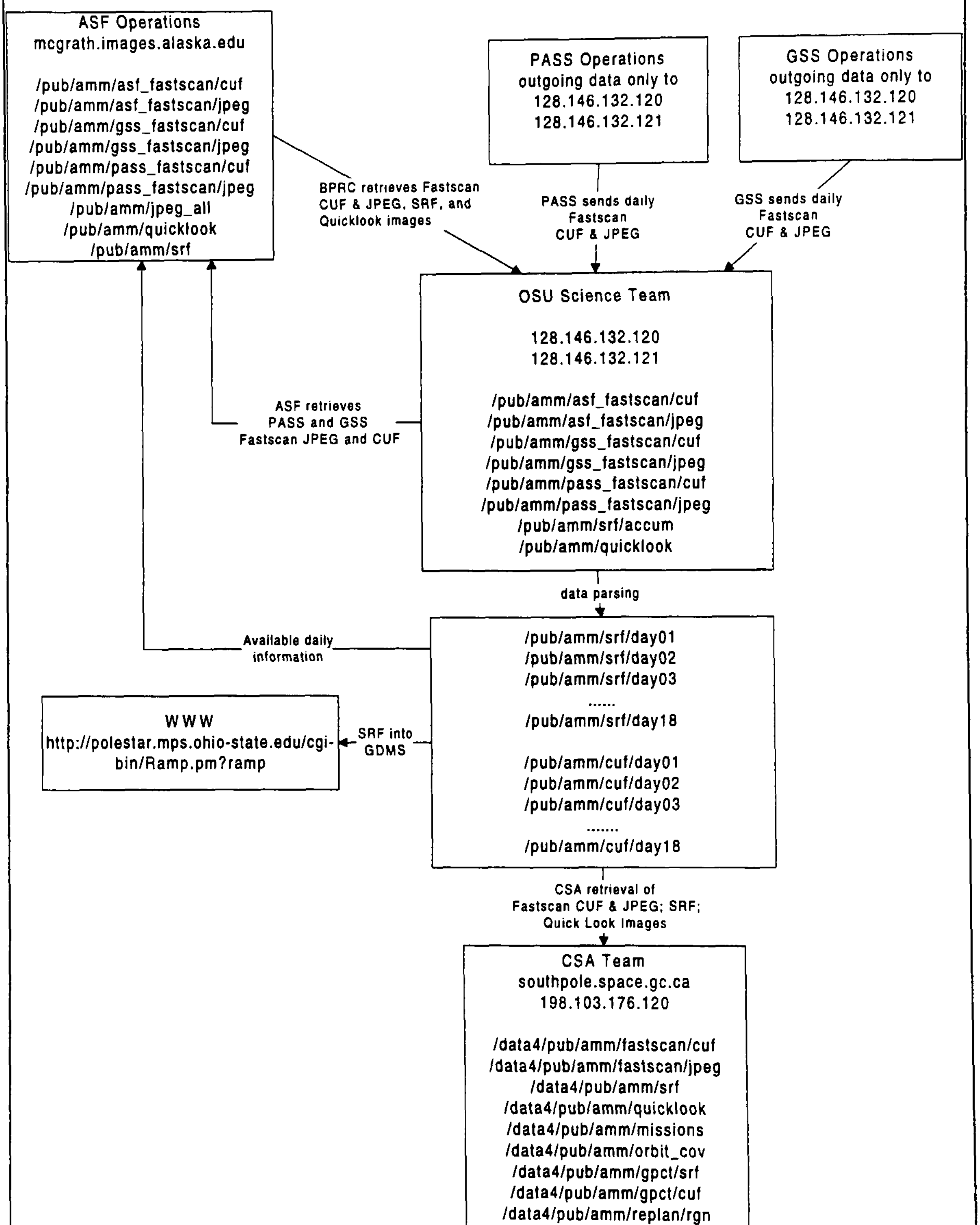
Katy F. Noltimier

3.0 Introduction

Two flow charts follow that maps out the physical layout of data flow during the amm and the file structure to be used at each locality.



Computer Layout and File Structure



3.1 BPRC File Structure (ICEBERG and POLESTAR).

3.1.1 FTP setup

For the AMM both iceberg and polestar ftp sites will be physically located on polestar in /datal/pub. A special ftp login and password will be assigned and given to AMM operators. Daily backups will be made and in the event that polestar crashes, all data, file structures, passwords, etc. will be re-established on iceberg. This will be the responsibility of the BPRC system manager, Victor Ziltshov, and should not affect the remote operators.

PASS and GSS operators will supply the OSU team leader with incoming fastscan information (#of JPEG's, #of CUF's, and corresponding orbit numbers) at the time of ftp.

128.146.132.121 (iceberg)
128.146.132.120 (polestar)

The polestar address is pending firewall permission from CSA for operators at GSS, PASS, and CSA (southpole) to be able to ftp to.

3.1.2 File Structure

Fastscan data will be separated into CUF and JPEG files and identified by the Satellite Receiving Stations (ASF, GSS, PASS). ASF fastscan data will be pushed (cron job) to BPRC by ASF. GSS and PASS fastscan data will be ftp'd to BPRC by GSS and PASS operators. Notification of transfer to BPRC and contents as described above needs to be done at time of transfer.

/pub/amm/asf_fastscan/cuf
/pub/amm/asf_fastscan/jpeg
/pub/amm/gss_fastscan/cuf
/pub/amm/gss_fastscan/jpeg
/pub/amm/pass_fastscan/cuf
/pub/amm/pass_fastscan/jpeg

BPRC operator will parse out daily CUF acquisitions corresponding to actual satellite acquisitions.

/pub/amm/cuf/day01
/pub/amm/cuf/day02
/pub/amm/cuf/day03
.....
/pub/amm/cuf/day18

SRF's will be pushed (cron job) to BPRC by ASF (ASF operator will need to oversee and notify BPRC of transfer).

/pub/amm/srf/accum

BPRC operator will parse out daily SRF acquisitions corresponding to actual satellite acquisitions.

/pub/amm/srf/day01
/pub/amm/srf/day02
/pub/amm/srf/day03
....
/pub/amm/srf/day18

Quicklook and images will have a specific directory. BPRC will retrieve files as they become available.

/pub/amm/quicklook

3.2 Canadian Space Agency File Structure (SOUTHPOLE)

3.2.1 FTP setup

At the moment all files will need to be retrieved from BPRC (due to firewall restrictions at CSA).

3.2.2 File Structure

I suggest keeping a similar, but simpler, file structure:

/data4/pub/amm/fastscan/cuf
/data4/pub/amm/fastscan/jpeg
/data4/pub/amm/srf
/data4/pub/amm/quicklook
/data4/pub/amm/missions
/data4/pub/amm/orbit_cov
/data4/pub/amm/gpct/srf
/data4/pub/amm/gpct/cuf
/data4/pub/amm/replan/rgn

3.3 Alaska SAR Facility File Structure (per Nettie 7/16/97)

3.3.1 FTP setup

An ftp site has been setup for the AMM as follows:

mcgrath.images.alaska.edu

Access is through 1) anonymous ftp and 2) password-required ftp.

1) Anonymous ftp is read only access and will be used for pulling data files from ASF to outside machines. Login: anonymous Password: your first name

2) Password ftp is read and write access and will be used to push files (Fastscan and SRF's from ASF to BPRC). All cron jobs will be associated with the password ftp. The password will be issued on a need to know basis.

3.3.2 File Structure

Cron jobs will be created to automatically place SRF's and Fastscan JPEG's and CUF's into their respective directories at ASF on *mcgrath*:

/pub/amm/asf_fastscan/cuf
/pub/amm/asf_fastscan/jpeg
/pub/amm/gss_fastscan/cuf
/pub/amm/gss_fastscan/jpeg
/pub/amm/pass_fastscan/cuf
/pub/amm/pass_fastscan/jpeg
/pub/amm/quicklook
/pub/amm/srf

Fastscan data will need to be pushed from ASF to BPRC. SRF's will need to be pushed from ASF to BPRC. Quicklooks can be retrieved or pushed as long as notification is given to BPRC by ASF.

Section 4: AMM Task List

Katy F. Noltimier

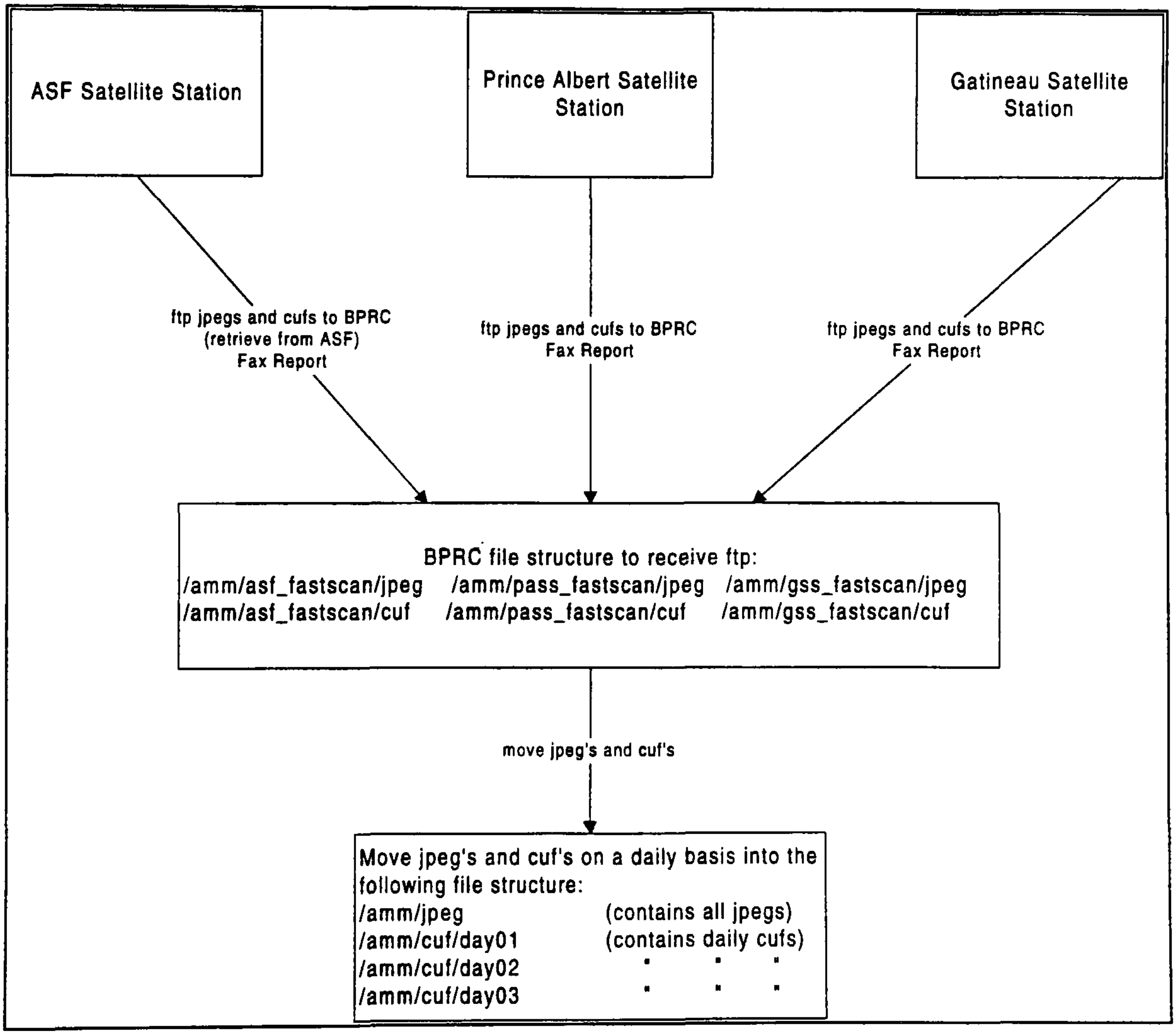
4.0 Introduction

This document contains an outline of tasks that the OSU Science Team needs to fulfill during the Antarctic Mapping Mission (AMM).

4.1 Fastscan Products

4.1.1 Receipt and parsing out of CUF and JPEG files from satellite receiving stations

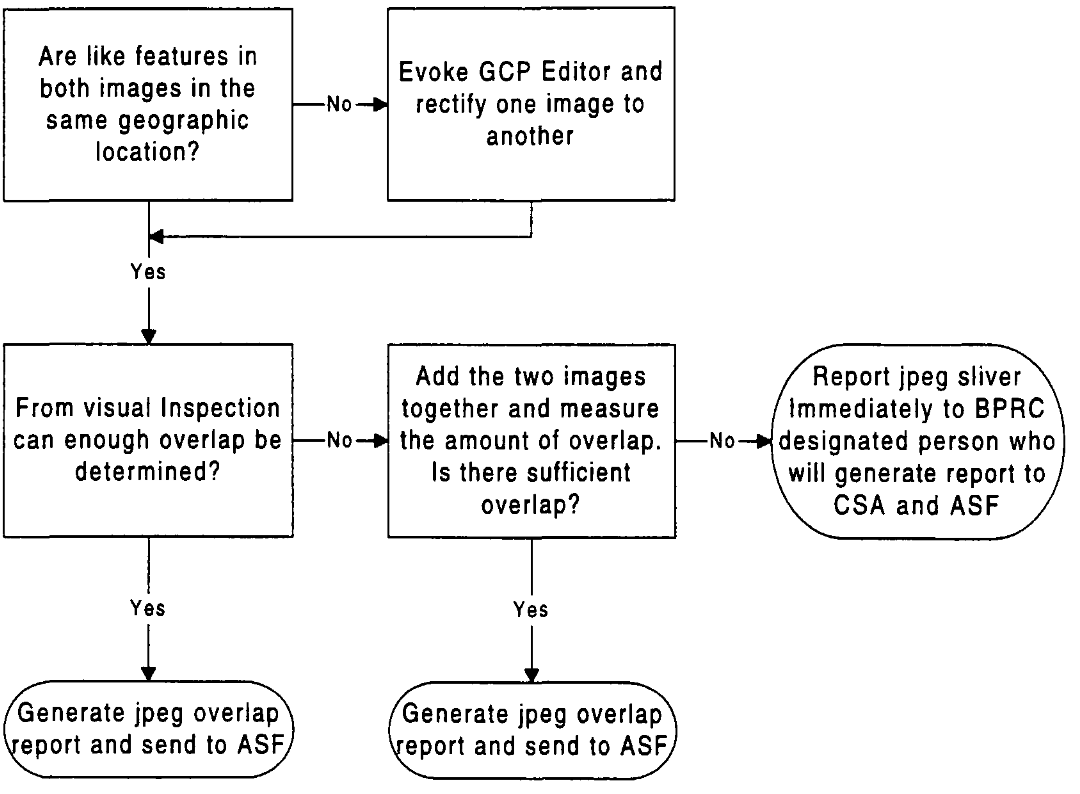
FASTSCAN DATA FLOW CHART



4.1.3 JPEG Sliver Checking Tasks (begin day 11)

1. Identify sliver pairs.
2. Perform sliver checking on pairs (IMAGINE):

SLIVER CHECKING PROCEDUE FLOWCHART

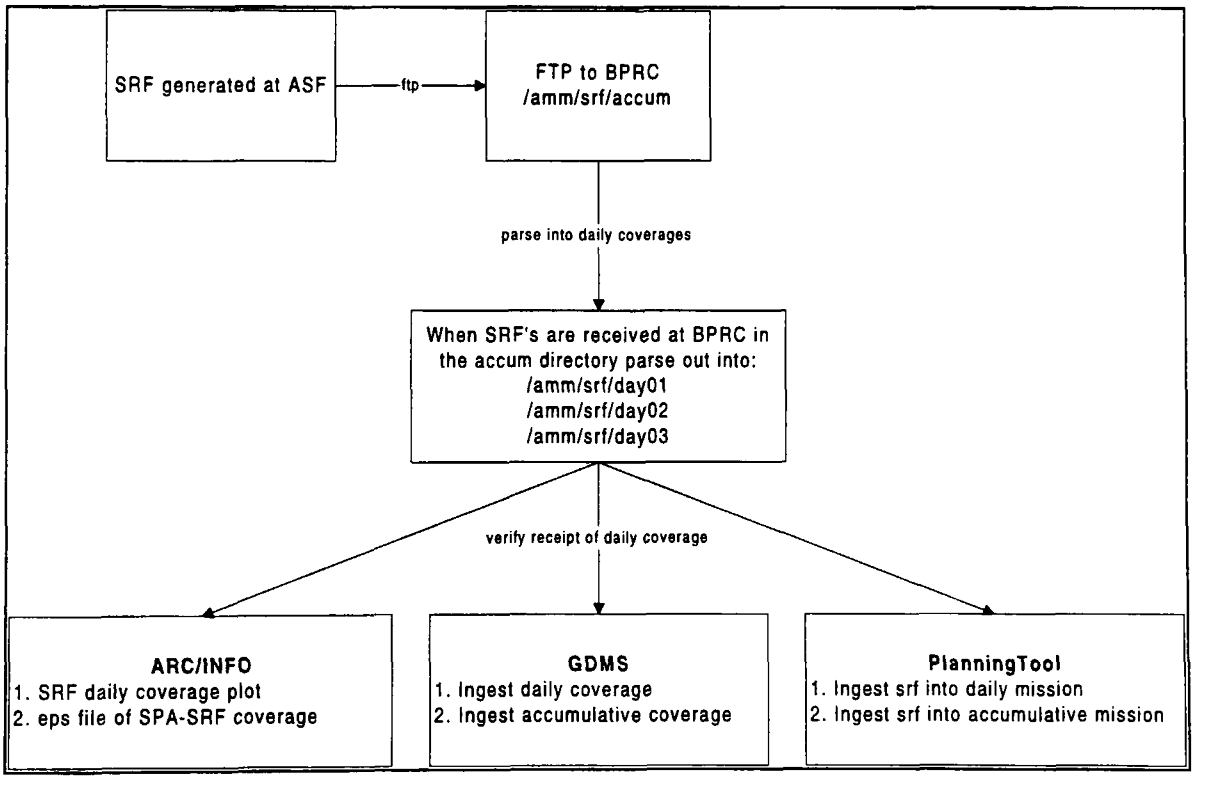


4.2 Scan Result Files

4.2.1 SRF Task List

1. Retrieve SRF's from ASF (when available) into /amm/srf/accum
2. Parse out into daily coverage directories: /amm/srf/day01, day02, ...
3. Verify receipt of entire daily coverage.
4. Create srf daily coverage plot (ARC/INFO) .
5. Create eps file of srf daily coverage plot (ARC/INFO) and place on ftp for CSA Team.
6. Create eps file of srf/cuf/spa daily coverage plot (ARC/INFO) and place on ftp for CSA Team.
7. Ingest daily coverage and accumulative coverage into GDMS.
8. Ingest daily coverage and accumulative coverage into PlanningTool.

SRF TASK FLOWCHART



4.3 Verification Of Geometry

1. Order quicklook image scenes over Dumont D'
2. Ftp the quicklook images
3. Perform analysis

4.4 Publicity Campaign

1. Assemble the "non-radar" scenes (photographs, maps, SPOT...)
2. Write up text portion for promo
3. Pre-assemble promo products for quick Radarsat assimilation
4. Order quicklook image scenes that correspond to pre-selected "non-radar" scenes
5. Ftp quicklook images
6. Prepare quicklook images for promo integration
7. Integrate quicklooks into final promo product

4.5 Data Management Needs

1. Work Schedules
2. Responsibility distribution
3. Communal Chart that shows tasks to be done and tasks completed
4. Checklists
5. Sliver report document
6. Daily Report document (Communication person (Ada Chan))

4.6 Communications

Daily action reports for Fastscan and SRF products will be maintained and communicated to all concerned parties. In addition checklist forms will be filled out daily to verify receipt of all data from the ground receiving station personel. The communications person will be responsible for communicating any and all changes in AMM operations. Attached are the AMM daily action reports and check lists.

FASTSCAN PRODUCT (cuf & jpeg) CHECKLIST

today's date: ____________
amm day: ____________

Problems: ______________________________
Action Taken: ______________________________
Outcome: ______________________________
Signed: ______________________________

		CUF Received		JPEG Received			
Orbit #	Time	Yes	No	Yes	No	# JPEGS	Station

FASTSCAN (jpeg and cuf) DAILY ACTION REPORT

Today's date: ________________
Signed ______________________

SPA-CUF eps file	amm day	status

Ingest into PlanningTool	amm day	status

JPEG Mosaic	amm day	status

Subset Orbits for Sliver Checkig	amm day	status

SCAN RESULT FILE CHECK LIST

day complete: ____________
amm day: ____________

Problems: ______________________________
Action Taken: ______________________________
Outcome: ______________________________
Signed: ______________________________

		SRF Received
Orbit #	Time	day
9896	0:33:36	
9896	0:38:15	
9897	1:23:28	
9897	2:19:01	
9898	3:55:37	
9898	3:59:47	
9899	5:40:37	
9900	7:21:20	
9901	9:02:00	
9902	10:42:48	
9903	12:23:34	
9904	14:04:19	
9905	15:45:25	
9905	15:47:14	
9906	17:23:30	
9906	17:26:21	
9906	17:28:03	
9907	18:22:36	
9907	19:07:03	
9907	19:08:46	
9908	20:47:53	
9908	20:49:35	

SCAN RESULT FILE DAILY ACTION REPORT

Today's date: ________________
Signed ______________________

SPA-SRF eps file	amm day	status

Ingest into GDMS	amm day	status

Ingest into PlanningTool	status

Section 5: JPEG Mosaic Procedure Manual

Hongxing Liu
Hong Gyoo Sohn
Biyan Li
Katy F. Noltimier

5.0 Abbreviated Steps

1. Set Workspace to: */data1/pub/amm/jpeg_mosaic/cuf_cov*
2. From icon panel click on SATTRACK and FASTSCAN CUF's to ARC REGION
3. Right click in LOAD CUF FILES. Get from: */data1/pub/amm/cuf/day01* (02, 03...)
4. SELECT ALL cuf files for that day.
5. Give a name for the ARC/INFO REGION coverage such as *day02_c*. Click APPLY
6. Set Workspace to: */data1/pub/amm/jpeg_mosaic/mosaic/day01*
7. From icon panel click FROM SAR PROCESSING and MOSAICKING FASTSCANJPEG IMAGE.
8. Right click in the LOAD CUF FILES. Get to: /data1/pub/amm/jpegs. Click OK
9. Select on cuf file at a time to create mosaic of each orbit individually.
10. Right click in the JPEG DIRECTORY. Get to: /data1/pub/amm/jpegs. Click APPLY.
11. Give a name for the FINAL MOSAIC such as orbit_o (e.g., o_04784). Click APPLY.
12. Continue steps 7-11 until all orbits have been mosaicked.
13. Lastly, mosaic all the orbits to produce a daily coverage mosaic. Click on DEM GENERATION and MOSAIC GRIDS.
14. Select all the orbit mosaics and give a name to the OUTPUT GRID such as day01_m.

5.1 Naming Convention Examples

- CUF coverage — day01_c
- orbit mosaic — o_04784
- daily jpeg mosaic — day01_m

5.2 Introduction

This manual outlines the step by step procedure for creating SPA-CUF and SPA_SRF coverage and eps maps during the Antarctic Mapping Mission. The directory layout is as follows:

/data1/pub/amm...

- .../jpeg_mosaic/cuf_cov — CUF daily coverage
- .../spa_srf — SRF daily coverage and SPA-SRF eps files
- .../spa_cuf — SPA-CUF eps files
- .../srf/day01 (day02, day03...) — The SRF files parsed on a daily basis
- .../cuf/day01 (day02, day03...) — The CUF files parsed on a daily basis

5.3 Login

In order for the OSU Science Team to interactively work on this project an AMM home directory with related subdirectories was created. Using the AMM login and password will allow all persons to have read and write capability.

From Polestar:

- login: amm
- psswd: ramp00
- cd amm/jpeg_mosaic

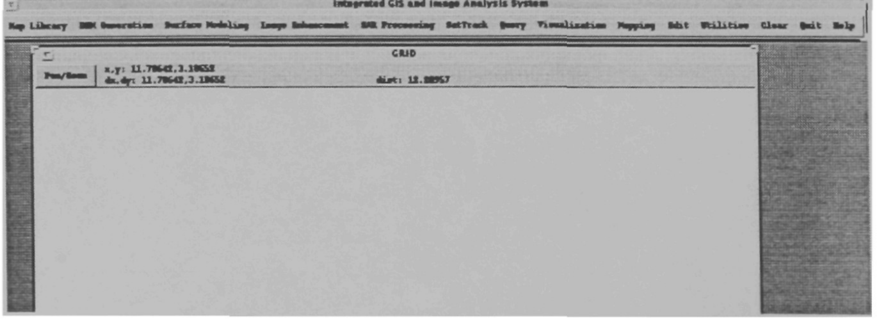
From Iceberg:

- login: amm
- psswd: ramp00
- rlogin polestar
- setenv DISPLAY iceberg:0.0
- cd amm/jpeg_mosaic

5.4 Arc/Info and the Integrated GIS & Image Analysis System

Arc/Info can be evoked from the /data1/pub/amm/jpeg_mosaic directory as follows:

- >arc
- ARC> &r /ramp/liu/ramp/lhx



5.4.1 Workspace Setting

It is important to write all new files in the correct directory. The first step is to create the CUF region coverage.

- From the Icon Panel select UTILITIES and WORKSPACE. Set the workspace to:

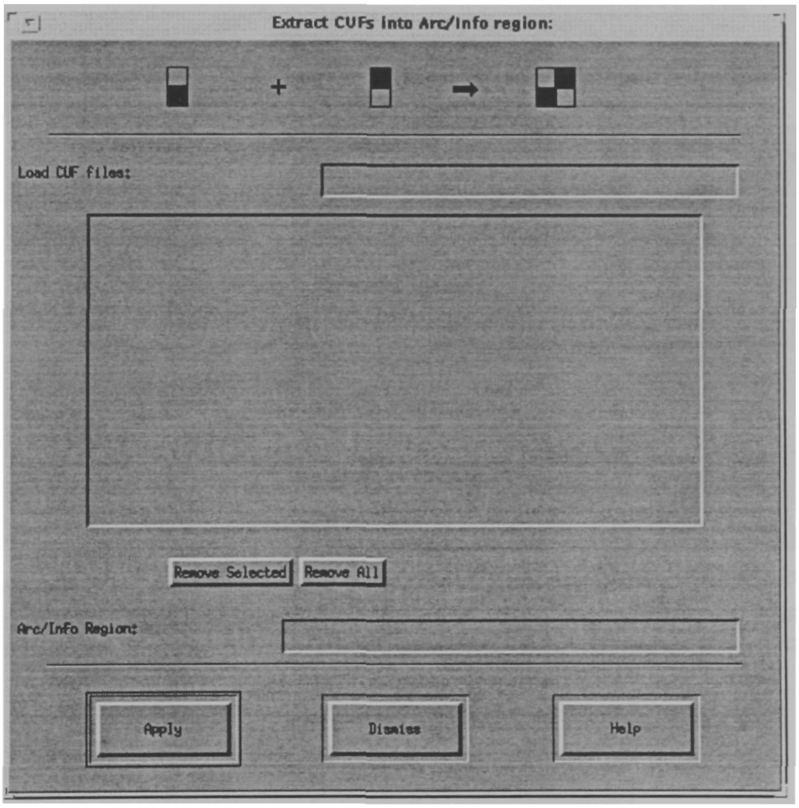
  /data1/pub/amm/jpeg_mosaic/cuf_cov

5.4.2 CUF Region Coverage (skip to step 5, page 6 if already done)

The CUF region coverage converts the Fastscan CUF text files into region and/or line coverage.

- From the icon panel click on SATTRACK and FASTSCAN CUF's to ARC REGION.

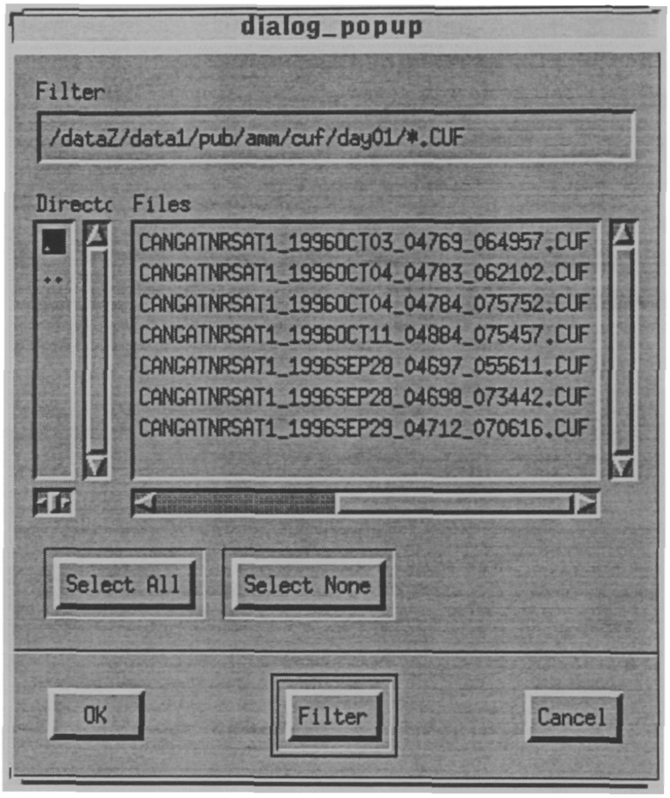
The display will look something like:



- Right click in the **LOAD CUF FILES** to evoke the ***Dialog_popup*** display. Select the directory the CUF files are in.

/data1/pub/amm/cuf/day01 (or day02, day03, day04.....)

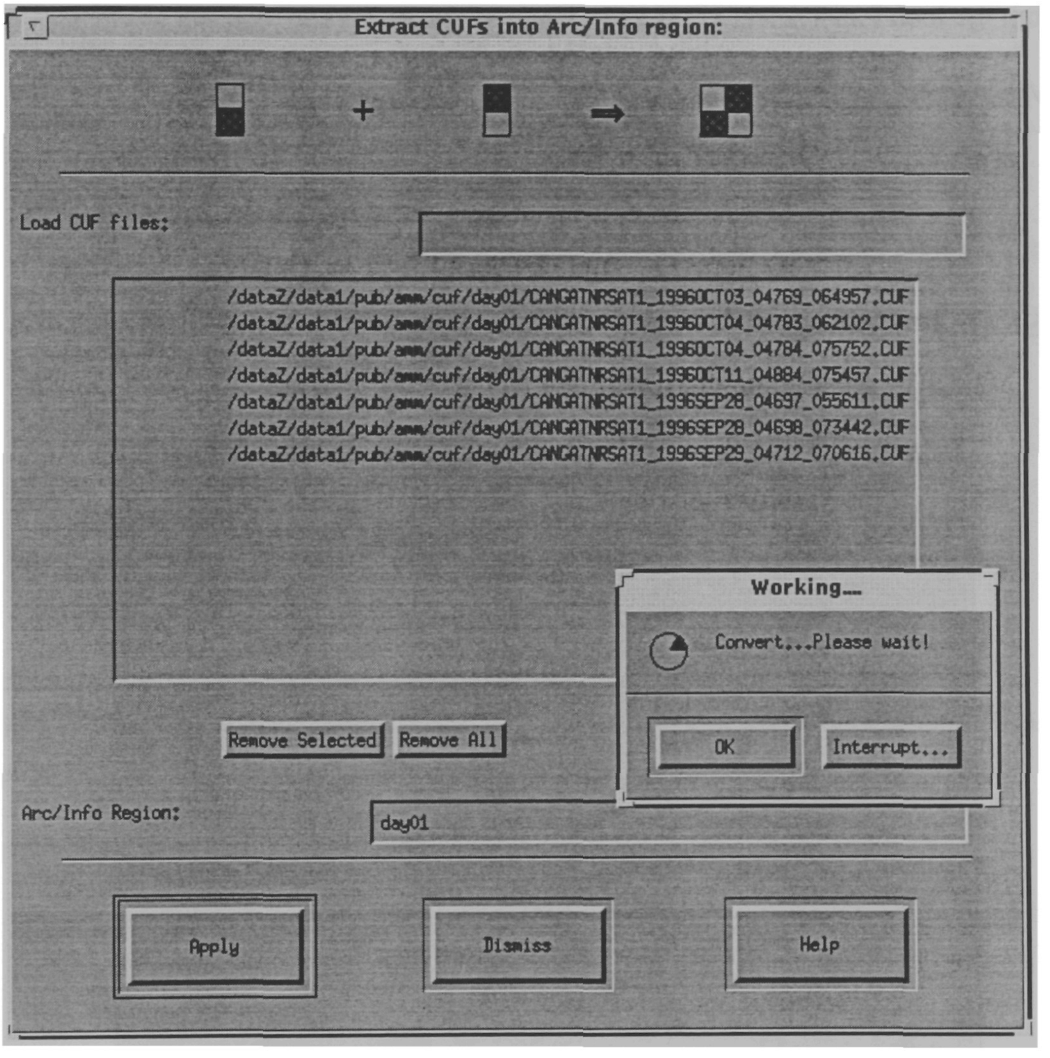
The CUF files will be displayed by clicking the **FILTER** button.



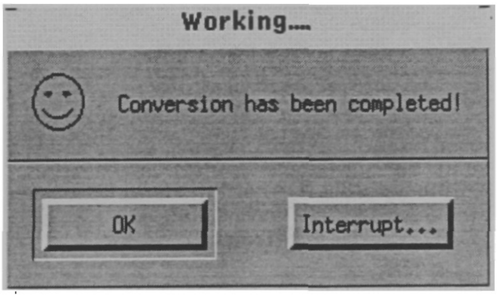
- **SELECT ALL** and click on **OK**.

** I would suggest waiting until all the CUF's have been retrieved from the various satellite stations and parsed out into daily coverage (/data1/pub/amm/cuf/day01...) and then select all the CUF's to create daily coverage.***

- Choose a name for the **ARC/INFO REGION** such as *day01_c* (c for cuf).
- Click **APPLY**.



When the operation is complete the following notice will be displayed:



5.4.3 Workspace Setting

It is important to write all new files in the correct directory. The next step is to create is the Fastscan JPEG Mosaic.

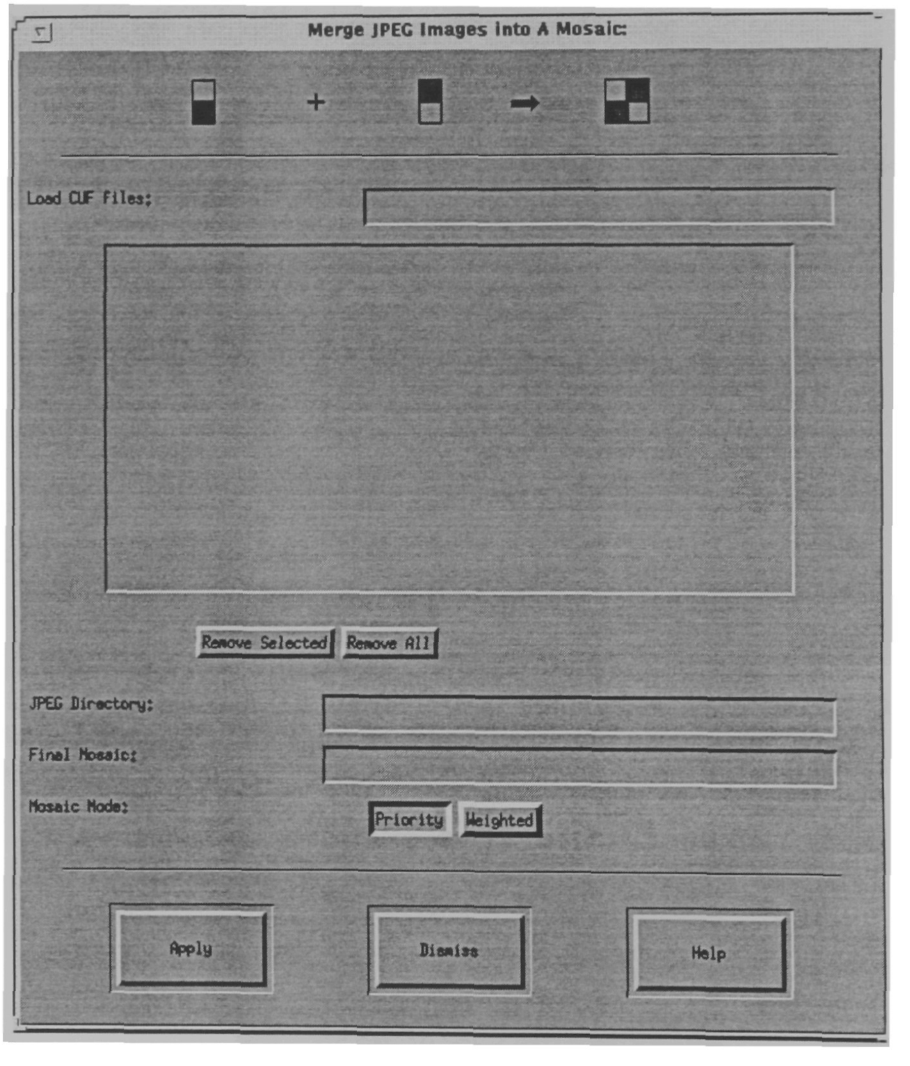
- From the Icon Panel select **UTILITIES** and **WORKSPACE**. Set the workspace to:

/data1/pub/amm/jpeg_mosaic/mosaic/day01 (day02, day03...)

5.4.4 Individual Orbit Coverage for Fastscan JPEG Mosaic

- From the Icon Panel select **FROM SAR PROCESSING** and **MOSAICKING**

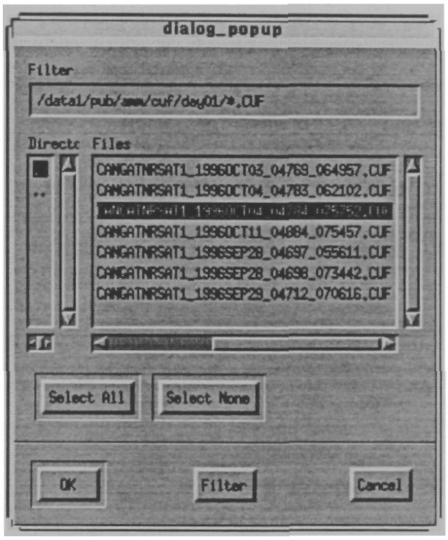
FASTSCAN JPEG IMAGE. The display will look like this:



- Right click in the **LOAD CUF FILES** box to display the following ***Dialog_popup***:
- Select the directory the CUF files are in.

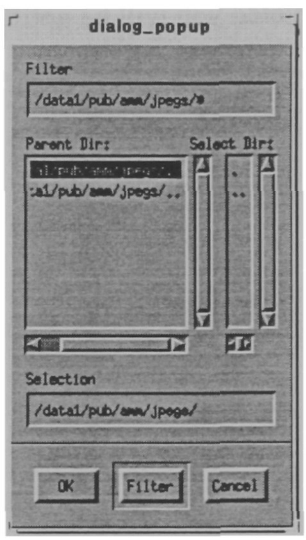
/data1/pub/amm/cuf/day01 (day02, day03, day 04.....)

The CUF files will be displayed by clicking the **FILTER** button.



- Select the individual CUF file of interest and click on **OK**.
- Right click in the JPEG DIRECTORY box to display the following ***Dialog_popup***:
- Select the directory that all the JPEG files are in.

/data1/pub/amm/jpeg

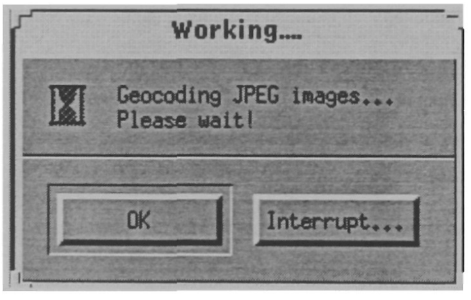


- Click on **OK**.

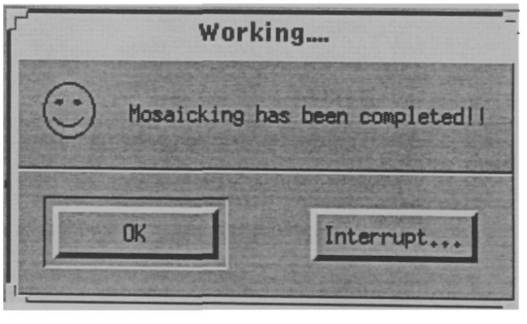
- Enter the name for the **FINAL MOSAIC** such as *04784_o* (o for orbit mosaic) in the appropriate box
- Click **APPLY.**

This routine will first check to make sure all the CUF's have matching JPEG's. If not, there will be this warning:

Otherwise the routine will continue and geocode all the individual JPEG images with the information contained in the CUF files. After geocoding, the routine will automatically begin the mosaicking process.



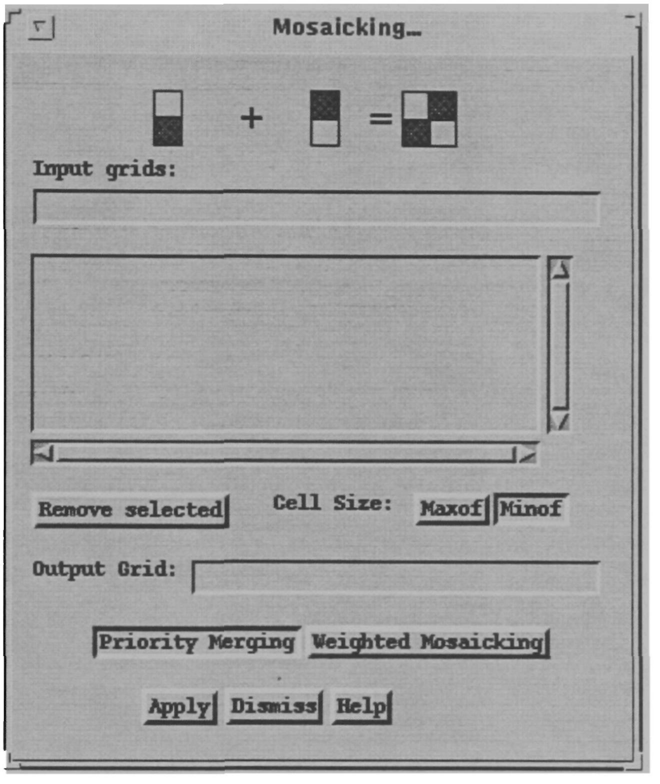
When the mosaicking has been completed you will be notified.



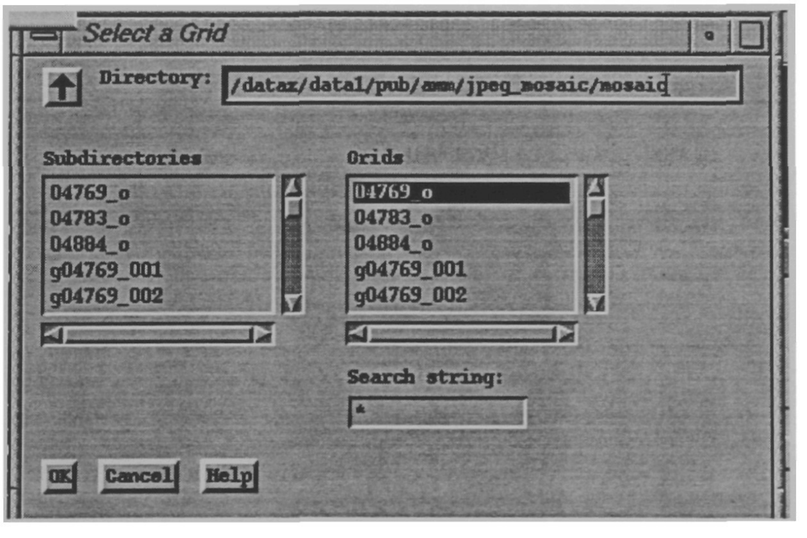
5.4.5 Daily Coverage of Fastscan JPEG Mosaic

The last step is to create a daily coverage of all the jpeg orbit mosaics. This is done by mosaicking all the orbit mosaics together.

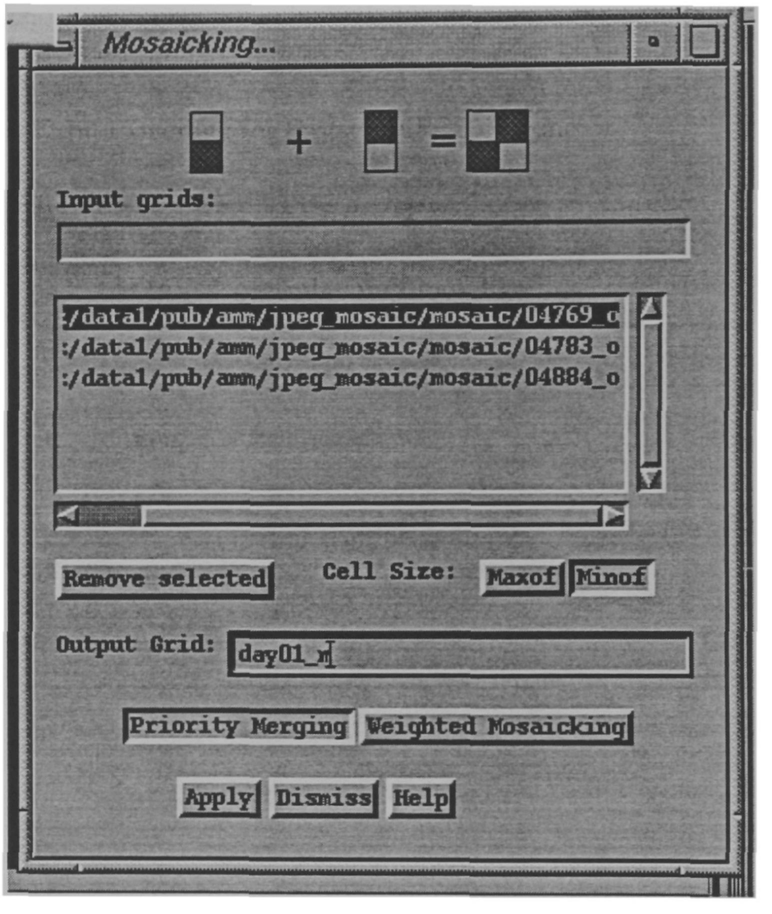
- Click on **DEM GENERATION** and **MOSAIC GRIDS**.



- Right click in **INPUT GRIDS** to display the SELECT A GRID dialog box:



- Choose the first mosaicked orbit and click **OK**.
- Repeat this until all the mosaicked orbits have been selected.
- Enter the **OUTPUT GRID** name such as *day01_m* (m for mosaic).



Section 6: SPA Region Coverage & EPS File Manual

Biyan Li
Katy F. Noltimier

6.0 Abbreviated Steps

6.0.1 Convert orbit plan to SPA coverage:

1. Change Workspace to */data1/pub/amm/spa*
2. Create Region SPA coverage from orbit plan (SatTrack, SPA Daily Coverage).
3. Convert orbit plan to UNIX Format (DOS=>UNIX)
4. Convert orbit plan to region SPA coverage (CONVERT)
5. Rename Region SPA coverage: ammcov1 to ammcov1_2 (_2 = orbit plan revision)

6.0.2 Create daily SPA coverage

1. View Daily Coverage
   - VISUALIZATION, NEW VIEW
   - COVERAGE & REGION
   - Right click in DATA SOURCE
   - Select Region Coverage that contains daily coverage of interest /data1/pub/amm/spa
   - Click on TEXT and change ATTRIBUTE column to ORBIT (optional).
   - Click on ADVANCE, select day of interest and delete others
   - De-select REGION OUTLINE
   - OK

2. View Coastline
   - COVERAGE & LINE /data1/pub/amm/coast/coast30

3. Draw

4. Save View
   - VISUALIZATION, SAVE VIEW
   - save view as spa03_2_view

6.0.3 Create SPA eps map

1. Create EPS Graphic File.
   - VISUALIZATION, VIEW TOOL
   - Click on CAMERA
   - Select PostScript (EPS) for Output Format
   - Change name (UNIX move (mv) command) of snapshot.eps file:
     > mv snapshot spa03_2.eps

6.1 Introduction

Region SPA coverage and daily SPA coverage maps will already be created and in the following file directories:

- /data1/pub/amm/spa/ammcov1_1   Region SPA coverage 1 (_1 is 1st plan)
- /data1/pub/amm/spa/ammcov2_1....   Region SPA coverage 2 (_1 is 1st plan)

Each region coverage will contain up to 100 orbits. These orbits will be grouped into daily coverage. For example ammcov1_1 may have day1, 2, 3, and 4. Where ammcov2_1 may have day 4, 5, 6, and 7. And so on. Notice that ammcov1_1 and ammcov2_1 both have some orbits of day 4. This is important when displaying and creating daily coverage maps.

Daily SPA coverage VIEWS and MAPS will already be created and in the following file directories:

- /data1/pub/amm/spa/spa02_1_view   Day 2 View SPA coverage (1st plan)
- /data1/pub/amm/spa/spa02_1.eps   Corresponding EPS file of that daily coverage

During the mission, the orbit plan may change. If this happens, revised Region SPA coverage and daily SPA coverage maps need to be created. The naming convention will be as follows:

- /data1/pub/amm/spa/ammcov1_2   Region SPA coverage 1 (_2 is 2nd plan)
- /data1/pub/amm/spa/ammcov2_2   Region SPA coverage 2 (_2 is 2nd plan)
- /data1/pub/amm/spa/ammcov3_2   Region SPA coverage 3 (_2 is 2nd plan)

6.2 Login

From polestar or southpole:

- login: amm
- passwd: ramp00
- cd amm/spa

From iceberg:

- login amm
- psswd: ramp00
- xhost +
- rlogin polestar
- setenv DISPLAY iceberg:0.0
- cd amm/spa

6.3 Invoke Arc/Info

From polestar or iceberg:

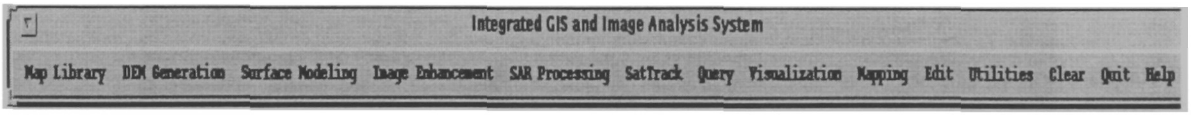
- > arc
- ARC> &r /ramp/liu/ramp/lhx

From southpole:

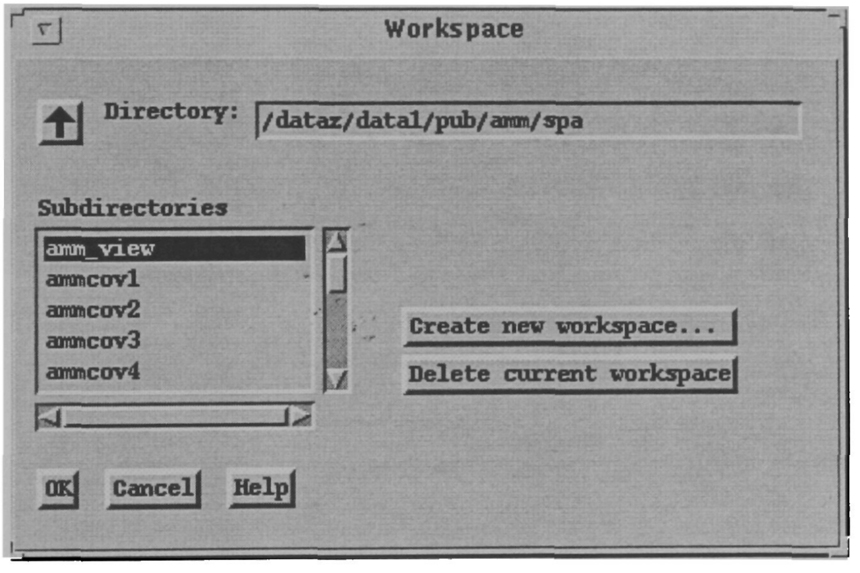
- >arc
- ARC> &r /data1/liu/ramp/lhx

6.4 Set Work Environment

From the ARC/INFO icon panel:



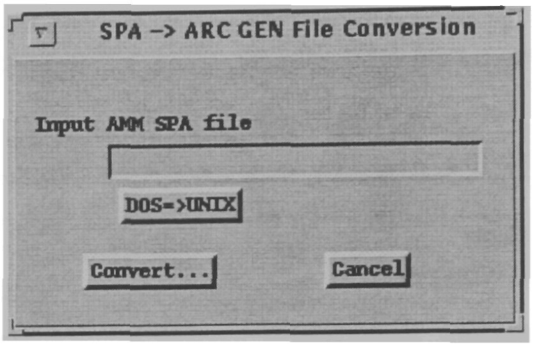
- Click on **UTILITY, WORKSPACE**.



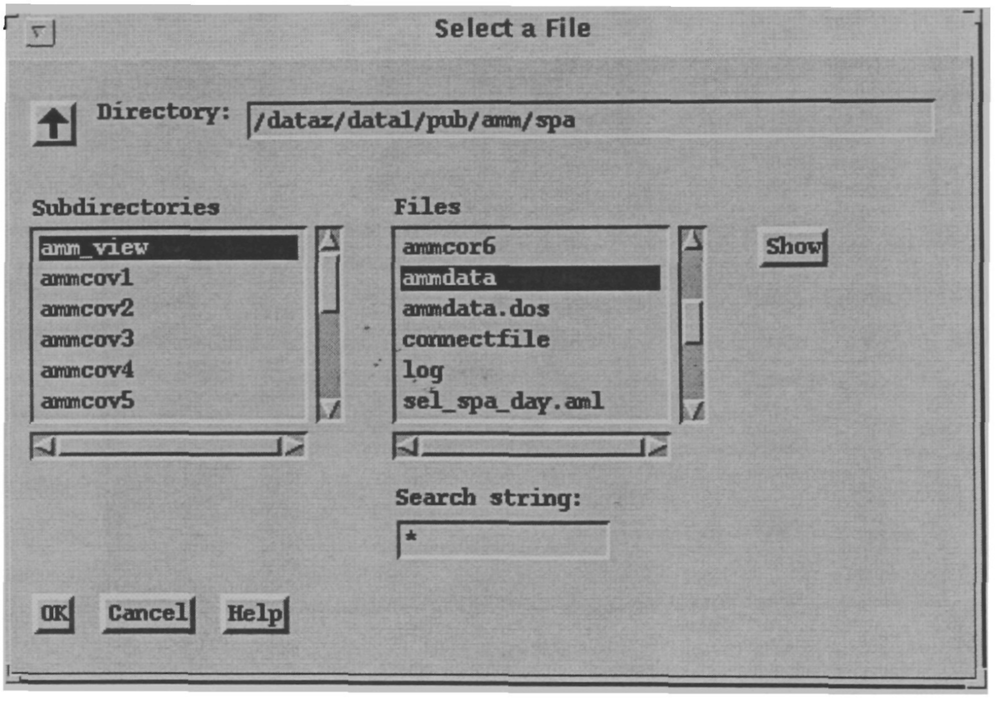
- Change (if necessary) the workspace to /data1/pub/amm/spa.
- Click **OK**.

6.5 Create Region SPA Coverage

- From the ARC/INFO Icon panel click on **SATTRACK, SPA DAILY COVERAGE**.



- Right click in **INPUT AMM SPA FILE** and select newest orbit plan.
- Click **OK**.



- From the SPA=>ARC GEN dialog box click on **DOS=>UNIX** box to make sure the new orbit plan is in **UNIX** format.

- Then click on **CONVERT** box to convert the orbit plan to Region coverage. This may take some time. The naming convention that is automatically applied is as follows:

ammcov1, ammcov2, ammcov3, ammcov4.... and so on.

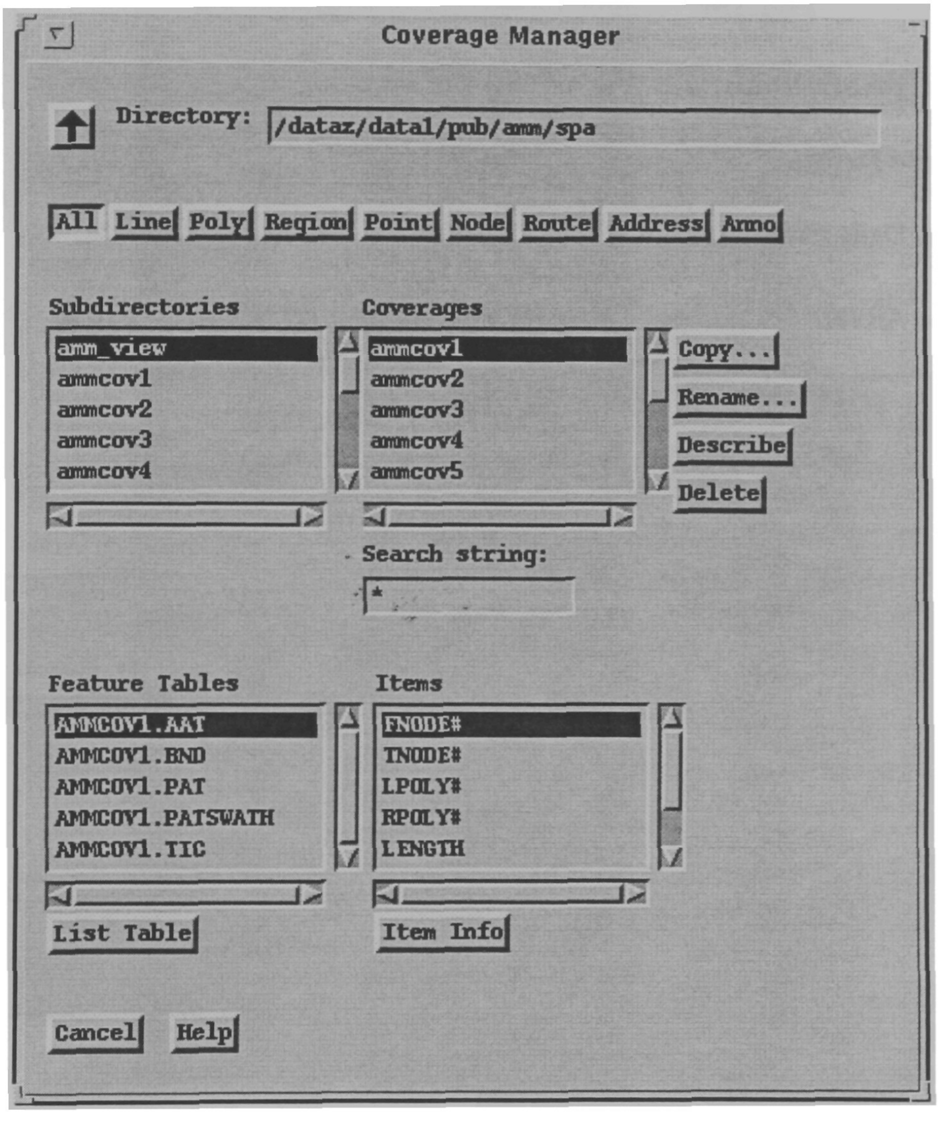
- After region coverage have been created click on **CANCEL** to dismiss the dialog box.

6.5.1 Renaming Region Coverage

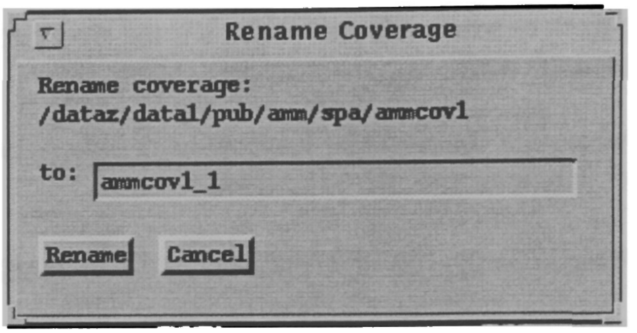
In order to keep track of what orbit plan revision is the most current, the following renaming scheme has been adopted:

> ammcov1_x (where x is the orbit plan revision number, e.g., x=1 is original or first plan, x=2 is 2nd plan, x=3 is third plan etc.)

- From the ARC/INFO icon panel click on **UTILITIES, COVERAGE MGMT**



- Click on **RENAME** and enter the NEW name for the region coverage:

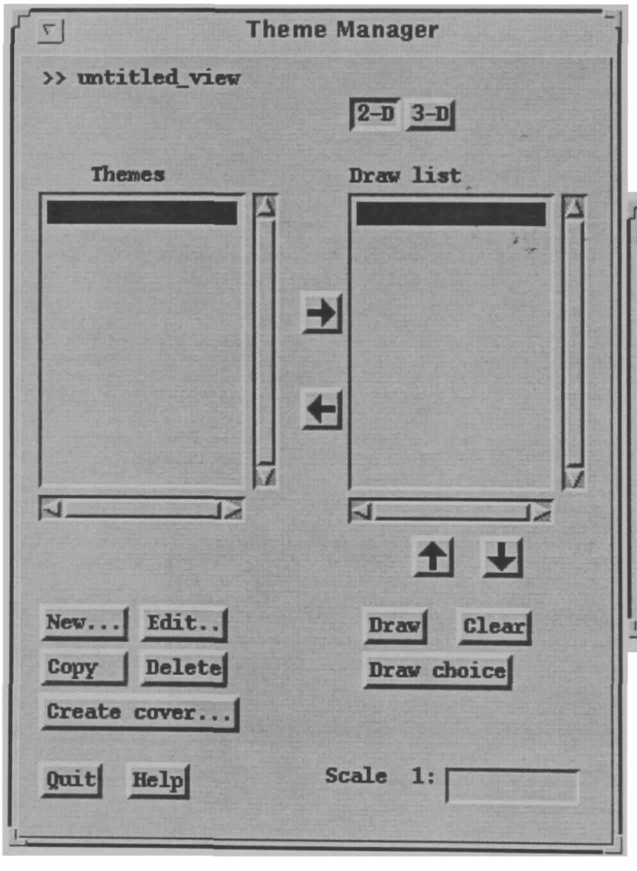


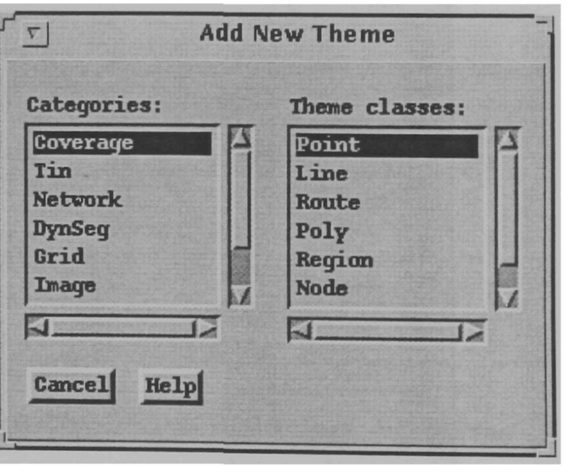
- Click **RENAME** button.

6.6 Create Daily SPA Coverage

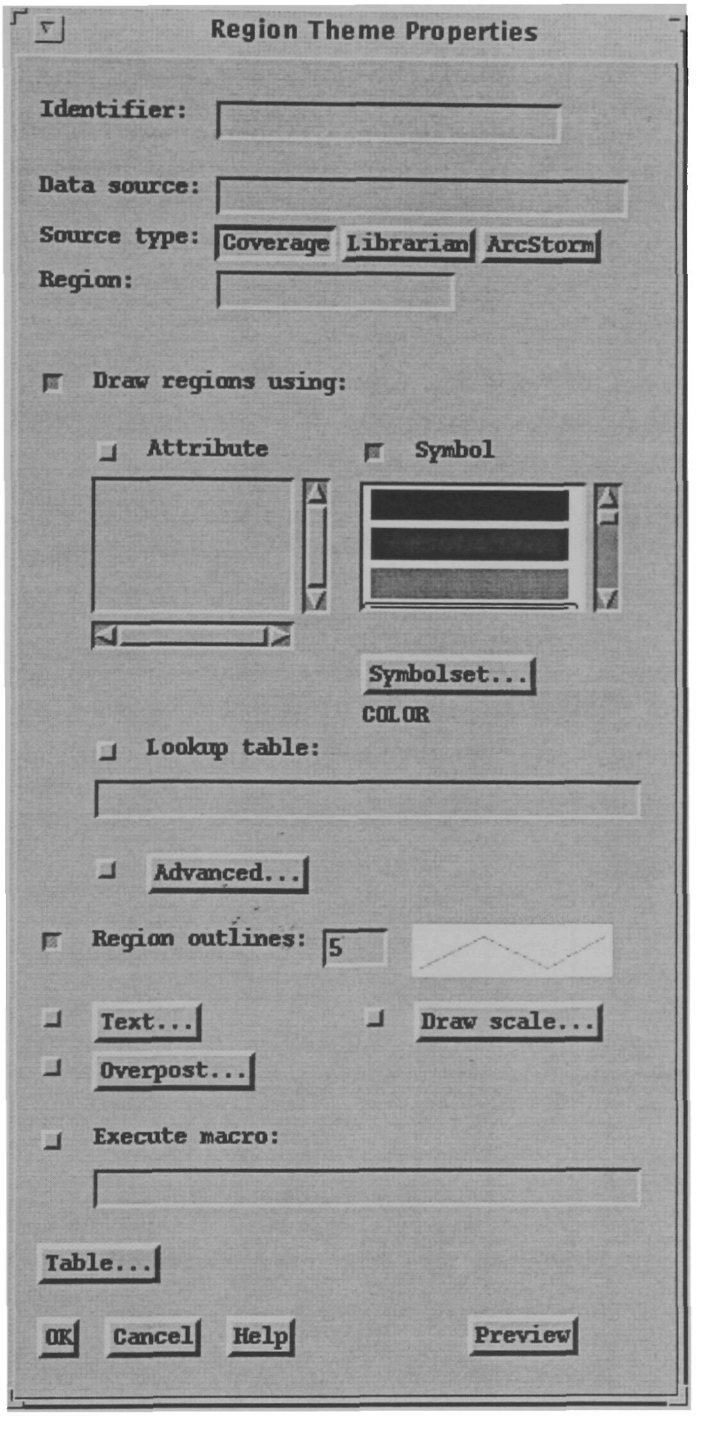
6.6.1 View Daily Coverage from Region Coverage

- From the ARC/INFO icon panel click on **VISUALIZATION, NEW VIEW**

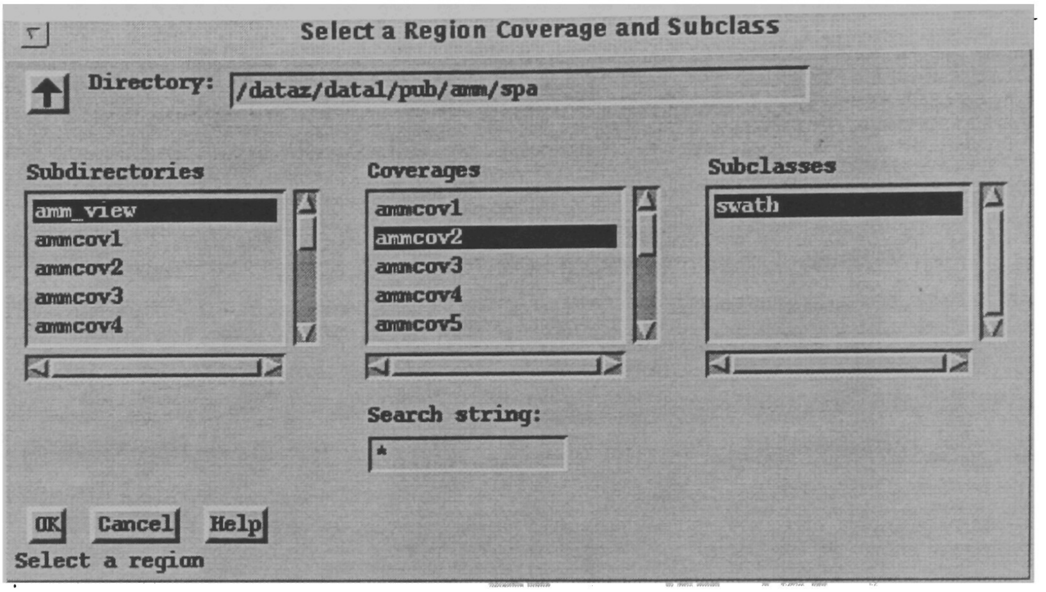




- Click on **COVERAGE and REGION** in the Add New Theme dialog box:

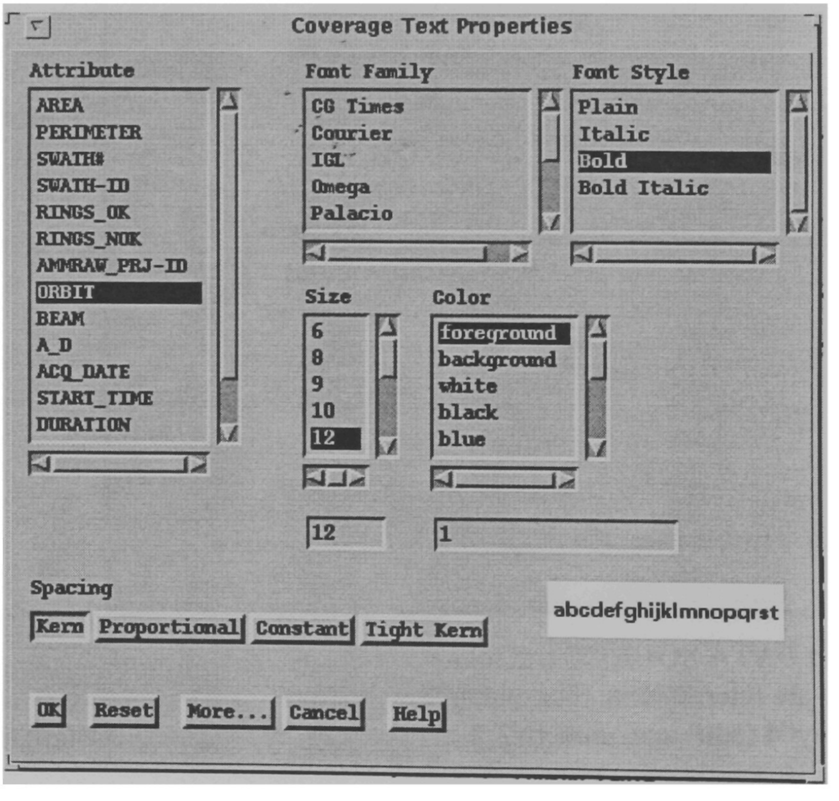


- Right Click in **DATA SOURCE** and select region coverage(s) which contain the daily coverage you are interested in. For example, ammcov1_1 may contain day01, day02, day03, and day04 (part) and ammcov2_1 may contain day04 (part), day05, day06, and day07.

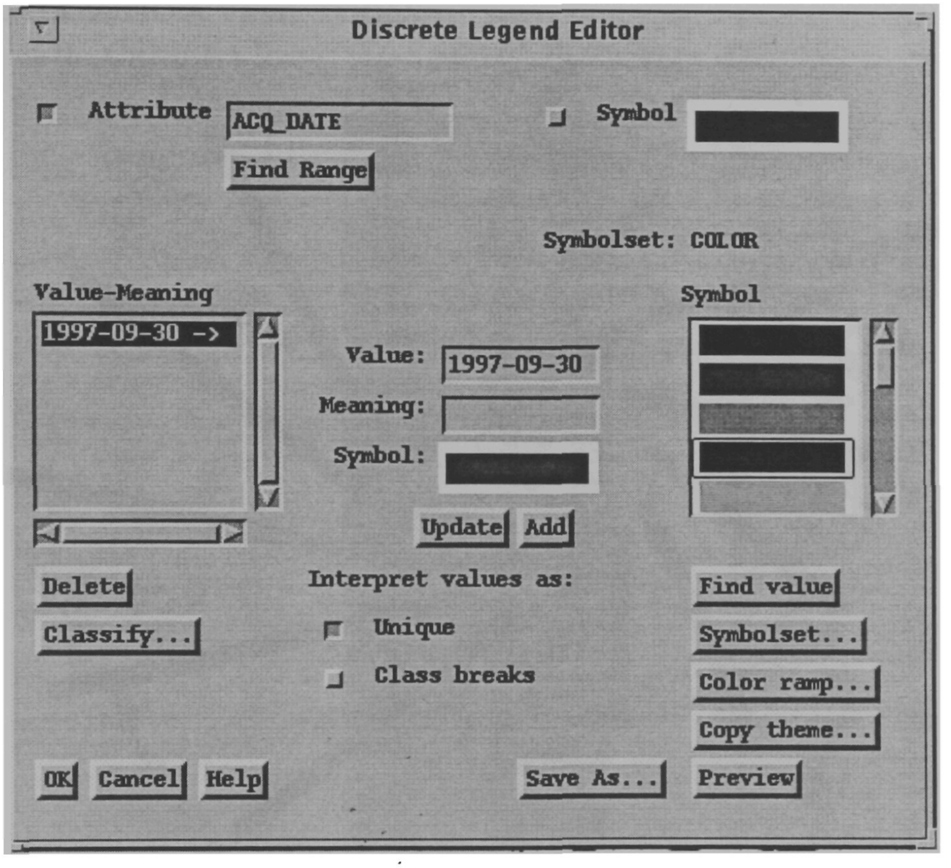


- Click on **OK**.

- From the REGION THEME PROPERTIES dialog box
- Click on **TEXT**

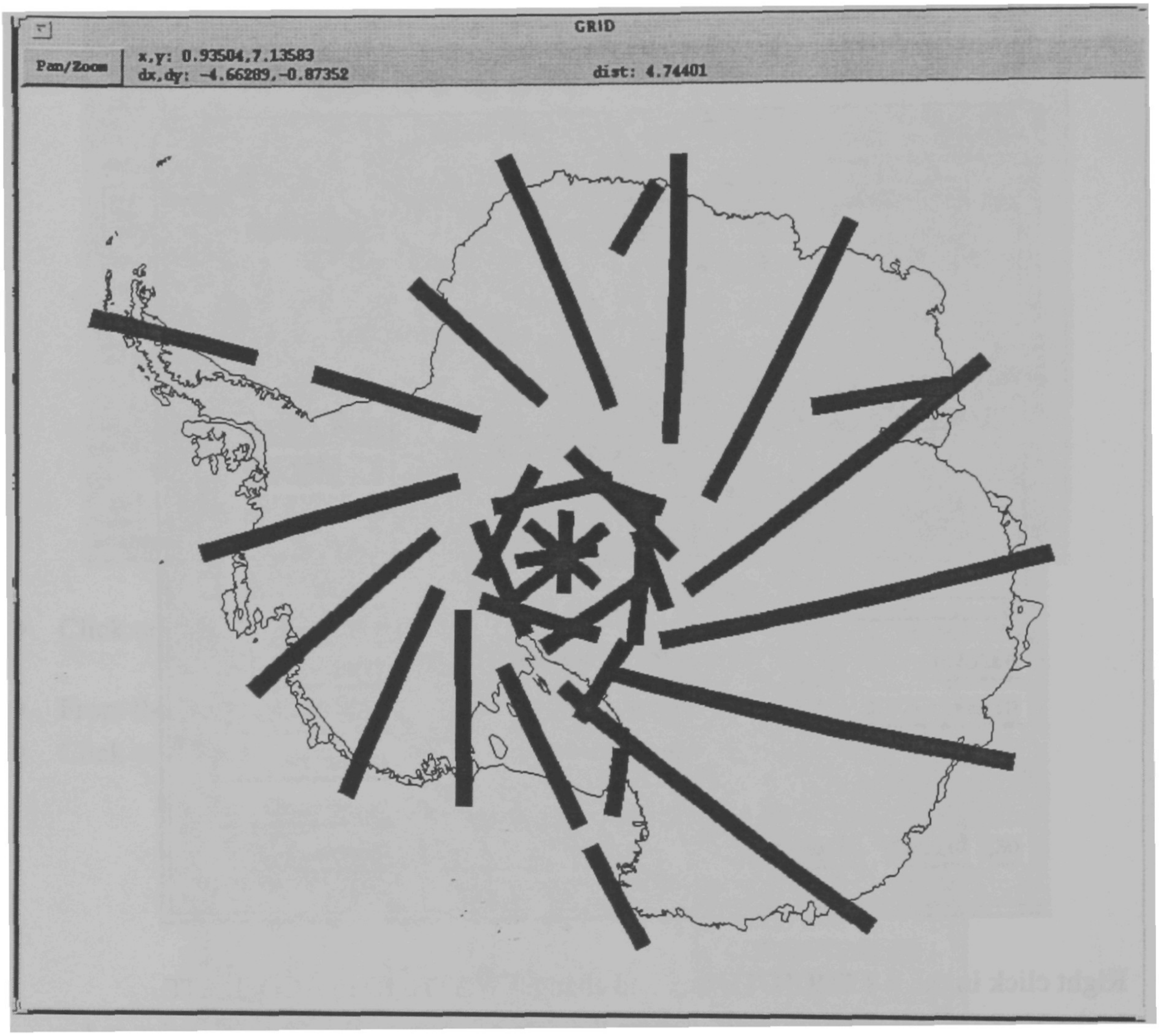


- From the ATTRIBUTE Column select **ORBIT**.
- Click **OK**.
- From the REGION THEME PROPERTIES dialog box Click on **ADVANCE**:



- Right click in the **ATTRIBUTE** box and changeSWATH_ID to ACQ_DATE.
- In the **VALUE-MEANING** box click on the date of interest, choose a color (i.e. red = SPA, blue=SRF, green=CUF).
- Click on **UPDATE**.
- Then delete all other days by selecting them and clicking on **DELETE**.
- When done, click on **OK**.
- From the REGION THEME PROPERTIES dialog box click on **REGION OUTLINES** to de-select it.
- Click **OK**.
- Move the coverage from THEME to DRAW LIST and click on **DRAW**. This will draw the daily coverage.
- Overlay this with a coastline coverage.

Daily coverage with coastline will look something like:



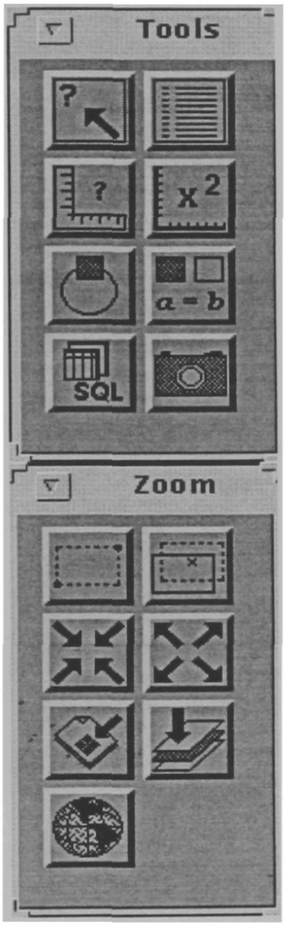
6.6.2 Save a View

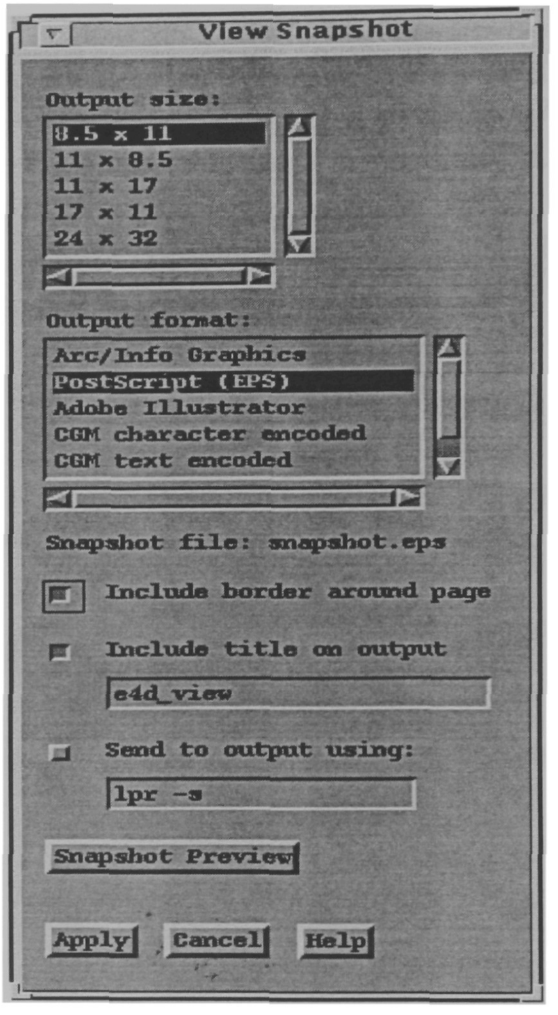
- From the ARC/INFO icon panel click on **VISUALZATION, SAVE VIEW**. Naming convention for VIEWS are as follows:

  spa3_02_view 3=day; 02=orbit plan revision

6.7 Create SPA EPS Graphic File

- While the VIEW is still active, from the ARC/INFO icon panel click on **VISUALIZATION, VIEW TOOLS.**
- Click on the **CAMERA** icon (fourth row, second column).





- To make a hard copy printout click on **SEND TO OUTPUT**.
- To make an *.eps file select **POSTSCRIPT** form the OUTPUT FORMAT section.
- Click on APPLY. A graphics file will be create with a default filename of snapshot.eps.
- Make sure you change this name BEFORE creating another graphics file. Naming convention for EPS files is as follows:

spa3_02.eps 3=day; 02=orbit plan revision.

Section 7: EPS Coverage Maps for SPA-SRF and SPA-CUF

Biyan Li
Hongxing Liu
Katy F. Noltimier

7.0 Abbreviated Steps

7.0.1 Create CUF Daily Coverage

1. Set Workspace to: */data1/pub/amm/jpeg_mosaic/cuf_cov*
2. From icon panel click on SATTRACK and FASTSCAN CUF's to ARC REGION
3. Right click in LOAD CUF FILES. Get from: */data1/pub/amm/cuf/day01* (02, 03...)
4. SELECT ALL cuf files for that day.
5. Give a name for the ARC/INFO REGION coverage such as *day02*_c. Click APPLY

7.0.2 Create SPA-CUF Coverage

1. Set Workspace to: */data1/pub/amm/spa_cuf*
2. View SPA daily coverage (*/data1/pub/amm/spa/spa02_1_view*)
3. Add CUF Region coverage for the corresponding day
4. (*/data1/pub/amm/jpeg_mosaic/cuv_cov/day02_c*)
5. (COVERAGE, LINE)

*** note SPA daily coverage will be RED
CUF line coverage will be GREEN
SRF line coverage will be BLUE

6. Overlay coastline (*data1/pub/amm/coast/coast30)*
7. Save combined SPA-CUF View as *spacuf_02_view*.

7.0.3 Create SPA-CUF EPS Maps

1. Create EPS graphic file for SPA-CUF daily coverage.
2. Change "snapshot.eps" output name to *spacuf_02.eps* (use UNIX "move" line command)

7.0.4 Create SRF Coverages

1. Set Workspace to*: /data1/pub/amm/spa_srf*
2. From icon panel click on SATTRACK and FASTSCAN SRF's to ARC REGION
3. Right click in LOAD SRF FILES. Get from: */data1/pub/amm/srf/day01* (02, 03...)
4. SELECT only up to 4 srf files for one region coverage.
5. Give a name for the SRF region coverage such as day01_1s, day01_2s....
6. Click APPLY.

7.0.5 Create SPA-SRF daily coverages

1. View SPA daily coverage *(/data1/pub/amm/spa/spa02_1_view)*
2. Add SRF Region coverage(s) for the corresponding day *(/data1/pub/amm/jpeg_mosaic/cuv_cov/day02_1s, day02_2s, day02_3s)* (COVERAGE, LINE)

*** note SPA daily coverage will be RED
CUF line coverage will be GREEN
SRF line coverage will be BLUE

3. Overlay coastline *(data1/pub/amm/coast/coast30*
4. Save combined SPA-SRF View as *spasrf_02_view* (this will be updated on a daily basis until all SRF's for a single day have been received).

7.0.6 Create SPA-SRF EPS Maps

1. Create EPS graphic file for SPA-SRF daily coverage.
2. Change "snapshot.eps" output name to *spasrf_02.eps*

7.1 Naming Convention

• spa02_1_view	spa daily coverage (02=day, _1 = orbit plan)
• day02_c	cuf daily coverage
• spacuf_02_view	daily spa and cuf combined coverage saved as VIEW
• spacuf_02.eps	daily spa and cuf combined coverage saved as eps map
• day02_1s	srf daily coverage (02=day 1=1st SRF file)
• spasrf_02_view	daily spa and cuf combined coverage saved as VIEW
• spasrf_02.eps	daily spa and cuf combined coverage saved as eps map

7.2 Introduction

This manual outlines the step by step procedure for creating SPA_CUF and SPA_SRF coverages and eps maps during the Antarctic Mapping Mission. The directory layout is as follows:

/data1/pub/amm...

• .../jpeg_mosaic/cuf_cov	CUF daily coverages
• .../spa	SPA Region and VIEW coverages
• .../spa_srf	SRF daily coverages and SPA-SRF eps files
• .../spa_cuf	SPA-CUF eps files
• .../srf/day01 (day02, day03...)	The SRF files parsed on a daily basis
• .../cuf/day01 (day02, day03...)	The CUF files parsed on a daily basis

7.3 CUF Region Coverage

7.3.1 Workspace setting

It is important to write all new files in the correct directory. The first step is to create the CUF region coverages.

- From the Icon Panel select **UTILITIES** and **WORKSPACE**. Set the workplace to:

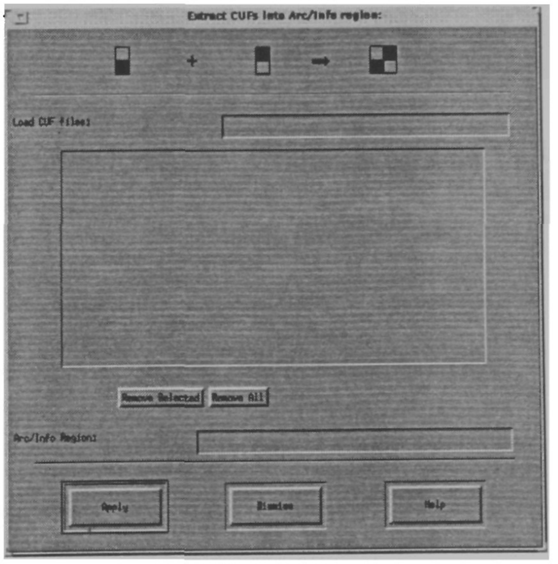
/data1/pub/amm/jpeg_mosaic/cuf_cov

7.3.2 CUF Region Coverage

The CUF Region Coverage converts the Fastscan CUF text files into a region and/or line coverage.

- From the icon panel click on **SATTRACK** and **FASTSCAN CUFs to ARC REGION**.

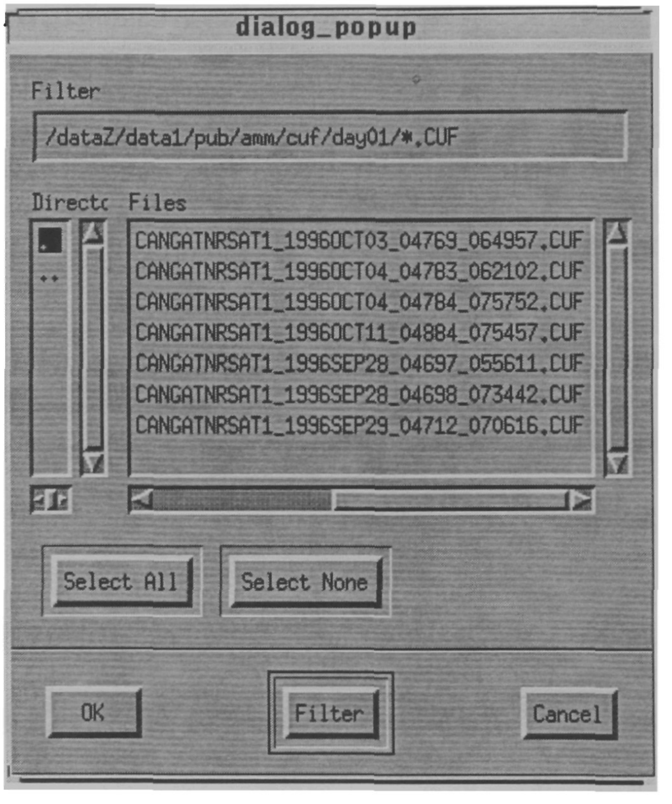
The display will look something like:



- Right click in the **LOAD CUF FILES** to evoke the ***Dialog_popup*** display.
- Select the directory the CUF files are in.

/data1/pub/amm/cuf/day01   (or day02, day03, day04.....)

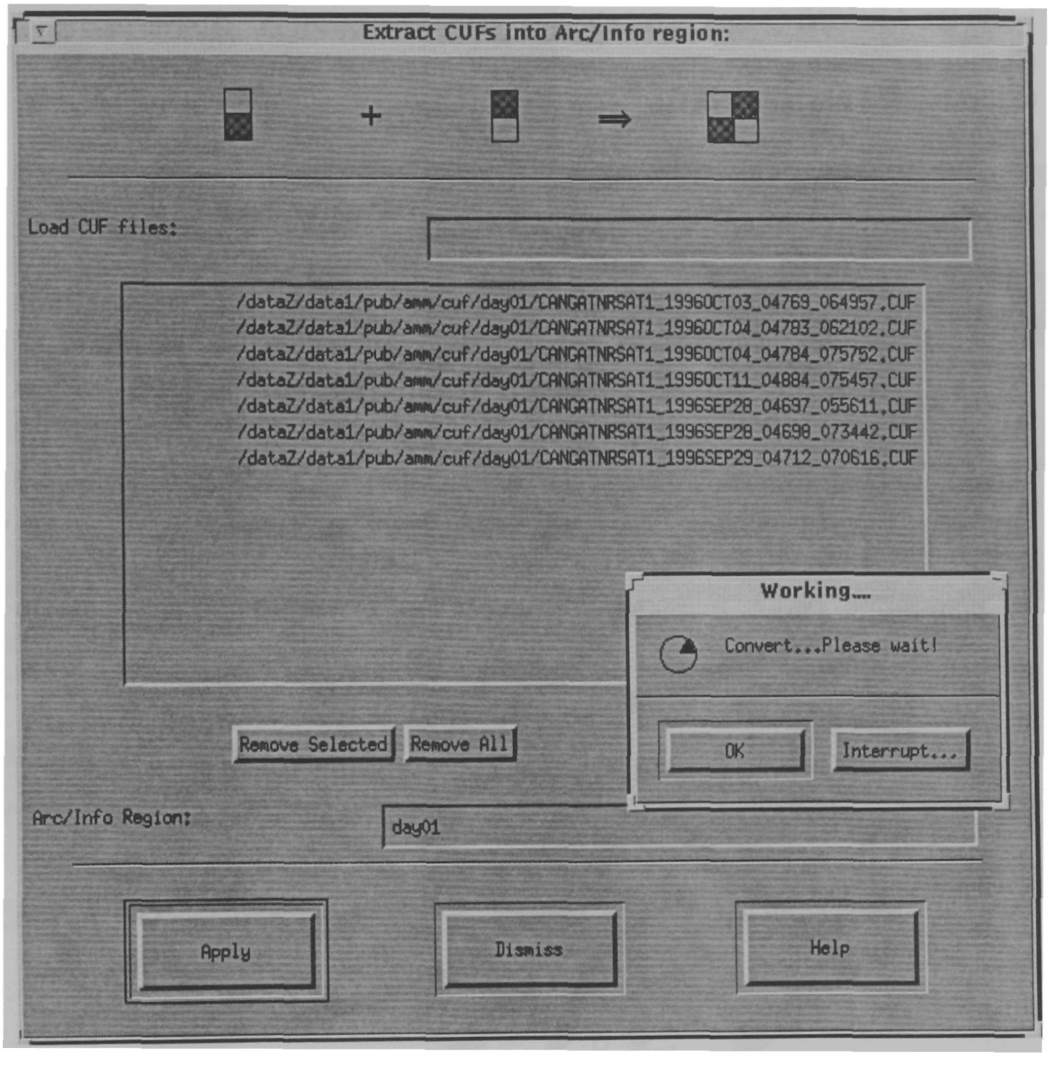
The CUF files will be displayed by clicking the **FILTER** button.



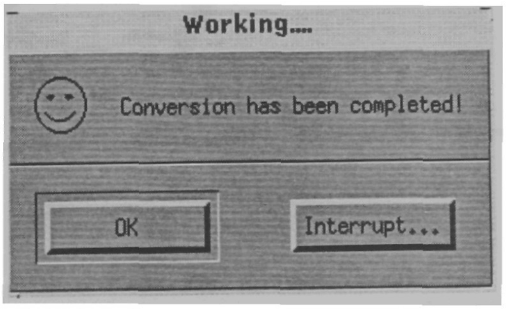
- **SELECT ALL** and click on **OK**.

** I would suggest waiting until all the CUF's have been retrieved from the various satellite stations and parsed out into daily coverages (/data1/pub/amm/cuf/day01...) and then select all the CUF's to create daily coverages.***

- Choose a name for the **ARC/INFO REGION** such as *day01_c* (c for cuf).
- Click **APPLY**.



When the operation is complete the following notice will be displayed:

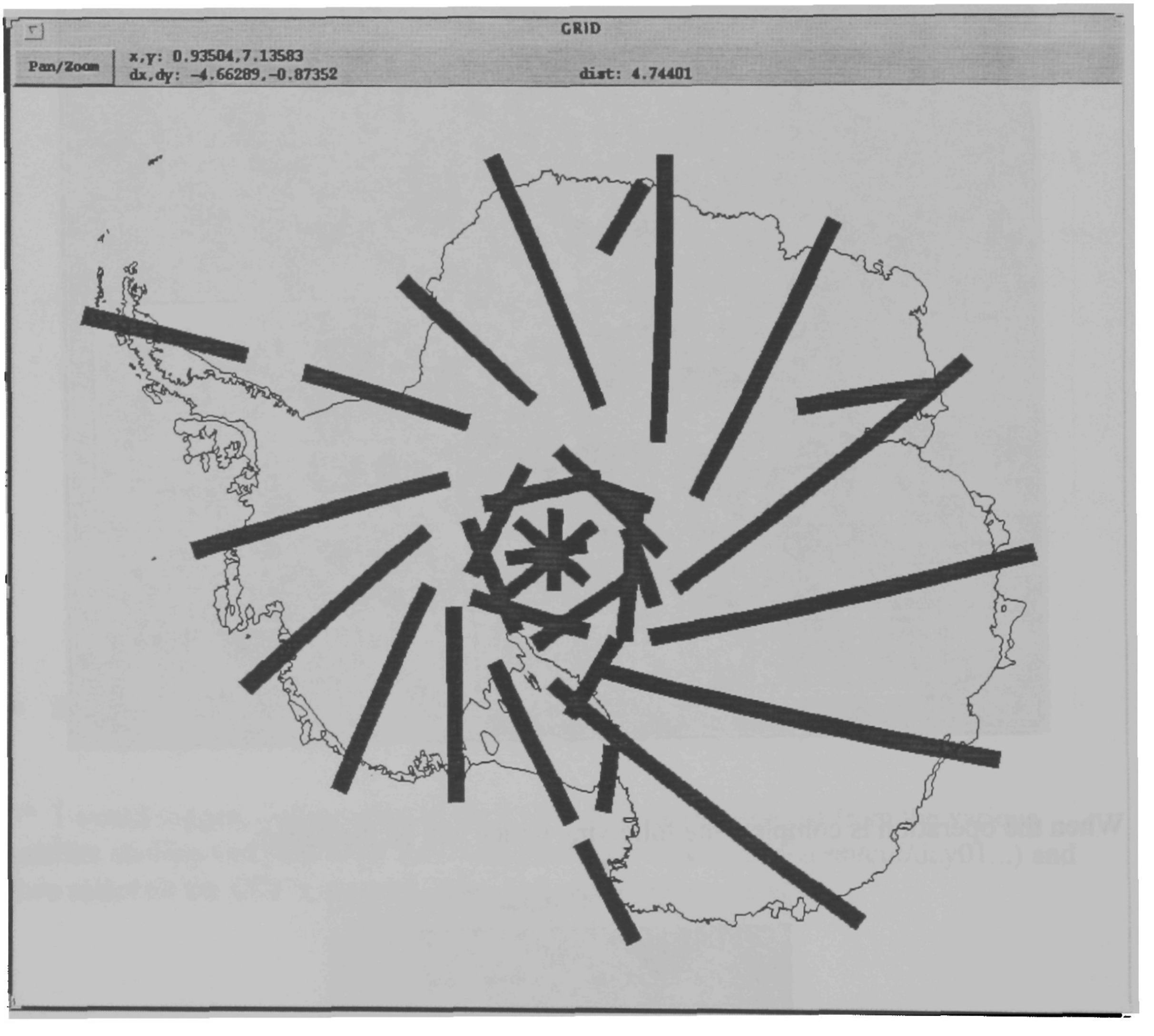


7.4 Creating a SPA_CUF View and EPS Map

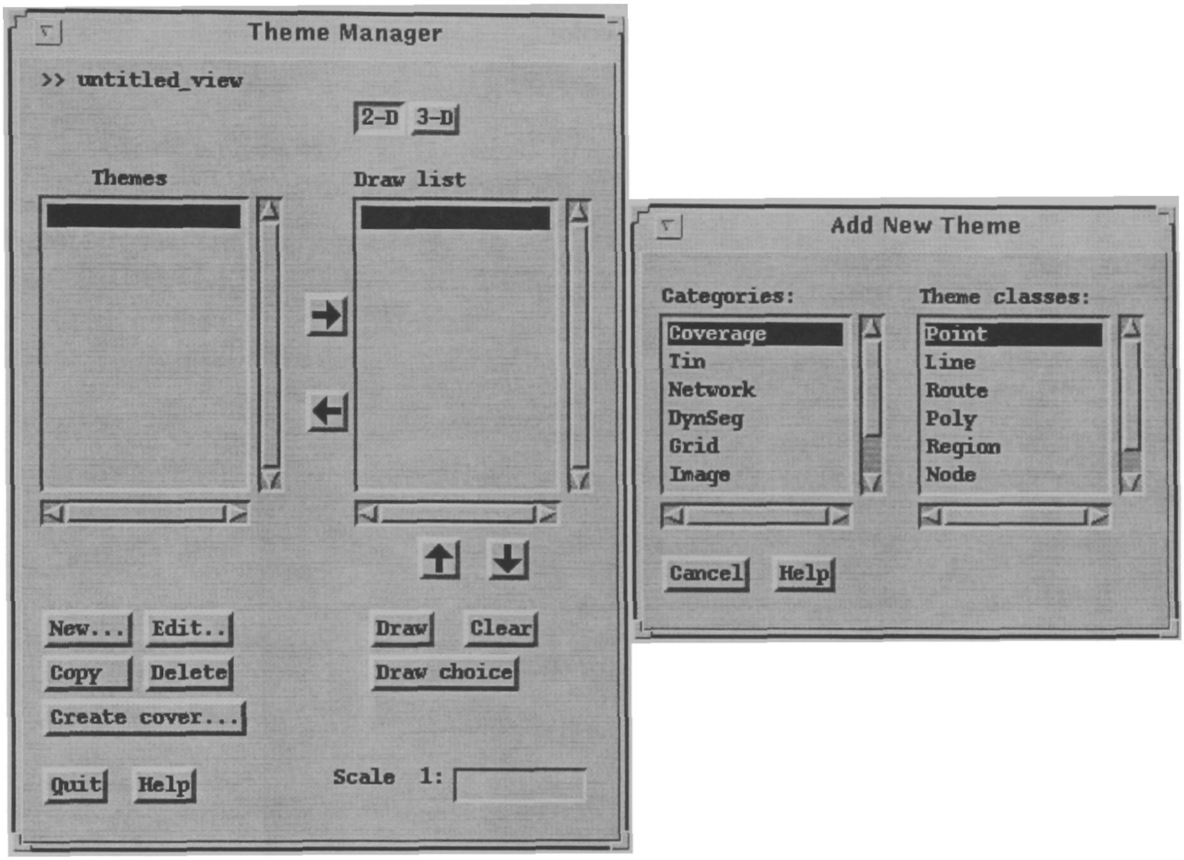
7.4.1 SPA_CUF View

- From the ARC/INFO icon panel click on **VISUALIZATION, OPEN VIEW.**
- Change the directory to /data1/pub/amm/srf/ and select the spa_view corresponding to the day you are interested in.
- Click **OK**.

The daily SPA coverage with coastline will be drawn.

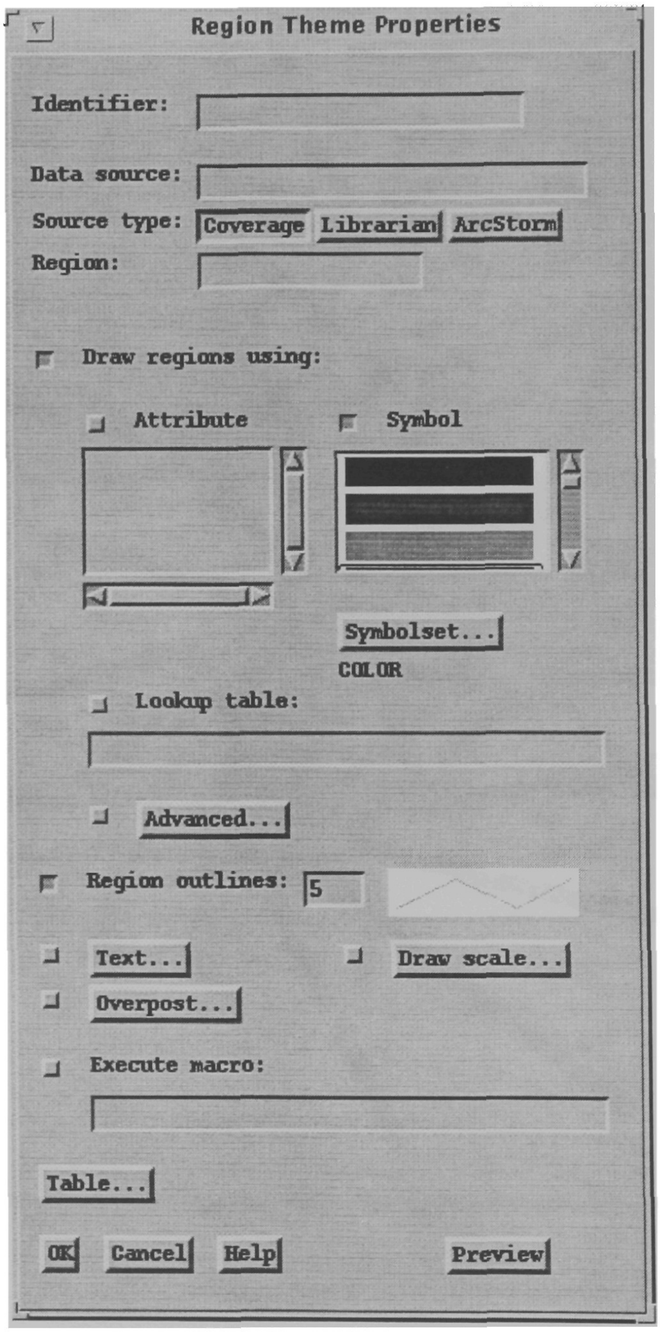


- Click on NEW in the THEME MANAGER dialog box to ADD NEW THEME.



- Click on **COVERAGE** then **LINE** in the Add New Theme dialog box.

- Right click in **DATA SOURCE** and select the CUF coverage that corresponds with the daily SPA coverage you already have displayed.
- Select **GREEN** for the CUF coverage color.
- Click **OK.**



- Move the coverage from the **THEME to DRAW LIST** and click on **DRAW CHOICE**.

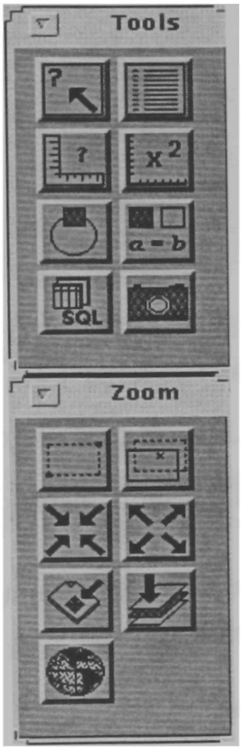
7.4.2 Save a View

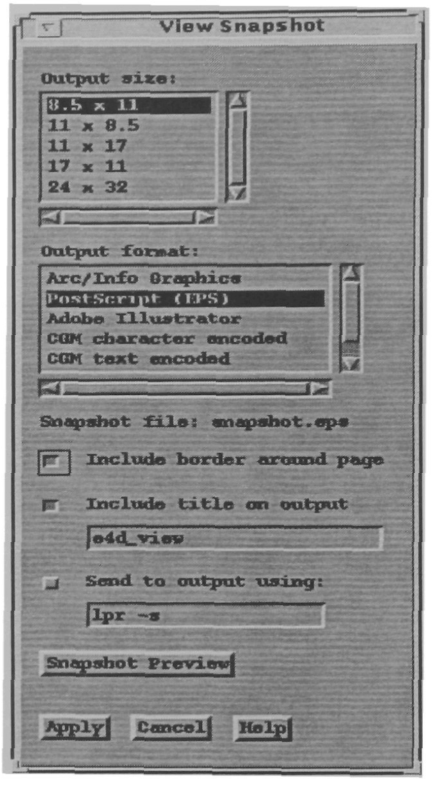
- From the ARC/INFO icon panel click on **VISUALZATION, SAVE VIEW**.
- Naming convention for VIEWS are as follows:

spacuf_03_view 03=day

7.4.3 Create an EPS Map

- While the VIEW is still active, from the ARC/INFO icon panel click on **VISUALIZATION, VIEW TOOLS**.
- Click on the **CAMERA** icon (fourth row, second column).





- To make a hard copy printout click on **SEND TO OUTPUT**.
- To make an *.eps file select **POSTSCRIPT** form the OUTPUT FORMAT section.
- Click on **APPLY**.

A graphics file will be create with a default filename of snapshot.eps.

- Make sure you change this name BEFORE creating another graphics file.
- Naming convention for EPS files is as follows:

spacuf_03.eps 03=day

7.5 SRF Region Coverage

SPA_SRF coverage map creation is almost identical to the SPA_CUF coverage map creation except that the workspaces are different and you will need to create several SRF coverage views to make up one daily coverage. The basic procedure follows:

7.5.1 Workspace setting

It is important to write all new files in the correct directory. The first step is to create the SRF region coverages.

- From the Icon Panel select **UTILITIES** and **WORKSPACE**. Set the workspace to:

  /data1/pub/amm/srf

7.5.2 SRF Region Coverage

The SRF Region Coverage converts the Fastscan SRF text files into a region and/or line coverage.

- From the icon panel click on **SATTRACK** and **FASTSCAN SRFs to ARC REGION**.
- Right click in the **LOAD SRF FILES** to evoke the ***Dialog_popup*** display.
- Select the directory the SRF files are in.
  /data1/pub/amm/srf/day01 (day02, day03...)
- The SRF files will be displayed by clicking the **FILTER** button.
- SELECT NO MORE THAN 4 SRF files at a time and click on **OK**.
- Choose a name for the **ARC/INFO REGION** such as ***day01_1s*** (_1s for 1st srf file).
- Click **APPLY**.

7.6 Creating a SPA_SRF View and EPS Map.

7.6.1 SPA_SRF View

- From the ARC/INFO icon panel click on **VISUALIZATION, OPEN VIEW**.
- Change the directory to */data1/pub/amm/srf/* and select the spa_view corresponding to the day you are interested in.
- Click OK. The daily SPA coverage with coastline will be drawn.
- Click on **NEW** in the THEME MANAGER dialog box to ADD NEW THEME.
- Click on **COVERAGE** and **LINE** in the Add New Theme dialog box.

- Right click in **DATA SOURCE** and select the SRF coverage that corresponds with the daily SPA coverage you already have displayed.
- Select **BLUE** for the SRF coverage color.
  Click **OK**.
- Move the coverage from the **THEME** to **DRAW LIST** anc click on **DRAW CHOICE**.

7.6.2 Save a View

- From the ARC/INFO icon panel click on VISUALZATION, SAVE VIEW.

Naming convention for VIEWS are as follows:

spasrf_03_view   03=day

7.6.3 Create an EPS Map

- While the VIEW is still active, from the ARC/INFO icon panel click on **VISUALIZATION, VIEW TOOLS.**
- Click on the **CAMERA** icon (fourth row, second column).
- To make a hard copy printout click on **SEND TO OUTPUT**.
- To make an *.eps file select **POSTSCRIPT** from the OUTPUT FORMAT section.
- Click on **APPLY**.

A graphics file will be create with a default filename of snapshot.eps.

- Make sure you change this name BEFORE creating another graphics file.
- Naming convention for EPS files is as follows:

spasrf_03.eps   03=day

Section 8: PlanningTool User Manual

Katy F. Noltimier

8.0 Introduction

The PlanningTool was developed by Vexcel Corporation as part of the Radarsat Antarctic Mapping System (RAMS). This software tool will be used to display daily and accumulated coverage of Catalog Update Files (CUF) and Scan Result Files (SRF).

8.1 Invoking the PlanningTool

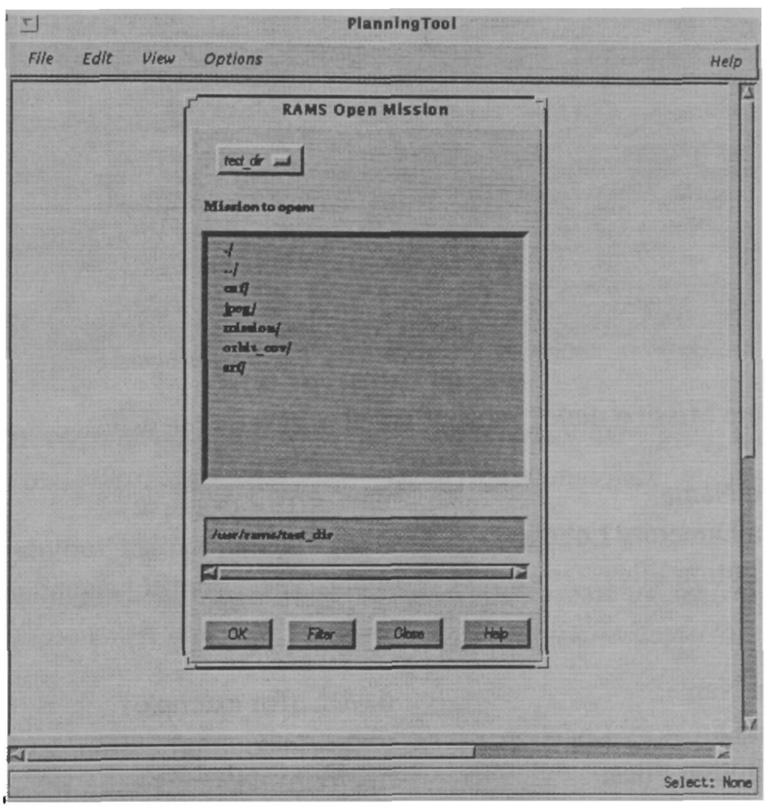
The initial system setup in order to evoke the Planning Tool is as follows:

From Polestar:

- *setenv RAMS_HOME /data2/vexcel/rams*
- *setenv RAMS_LOAD /data1/pub/amm/plan_tool* (sets default directory)
- *cd $RAMS_HOME/bin*
- *PlanningTool*

From Southpole:

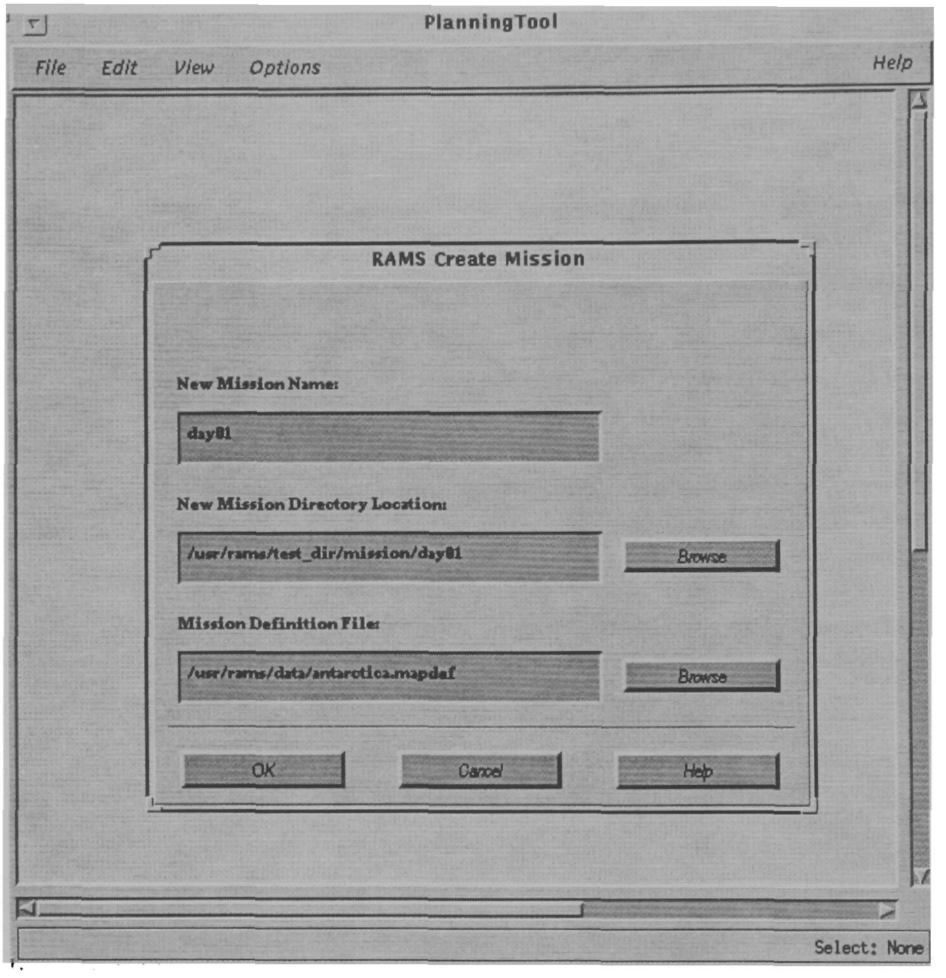
- *setenv RAMS_HOME /usr/rams*
- *setenv RAMS_LOAD /data4/pub/amm/* (sets default directory)
- *cd $RAMS_HOME/bin*
- *PlanningTool*



A RAMS Open Mission dialog box will automatically be displayed.

8.2 Create a New Mission:

- Close RAMS Open Mission dialog box
- Click on **FILE, NEW, MISSION** from the PlanningTool panel



The RAMS Create Mission dialog must be filled in exactly the way:

From Polestar

• New Mission Name:	day01 (for example)
• New Mission Directory Location	/data1/pub/amm/plan_tool/day01
• Mission Definition Files:	/data2/vexcel/rams/data/antarctica.mapdef

From Southpole

• New Mission Name:	day01 (for example)
• New Mission Directory Location	/data4/pub/amm/mission/day01
• Mission Definition Files:	/usr/rams/data/antarctica.mapdef

- Click **OK**

This function will take 10-15 minutes.
The mission directory in Polestar (/data1/pub/amm/plan_tool/day01) or in Southpole (/data4/pub/amm/mission/day01) will look like:

```
drwxr-xr-x   11 kfn   user   4096 Jul 23 13:57 .
drwxr-xr-x    4 kfn   user     47 Jul 23 18:15 ..
-rw-rw-r--    1 kfn   user     89 Jul 23 13:41 .errorid
-rw-rw-r--    1 kfn   user     87 Jul 23 13:41 .jobid
-rw-rw-r--    1 kfn   user     86 Jul 23 13:41 .ovid
-rw-rw-r--    1 kfn   user     87 Jul 23 13:41 .reqid
-rw-r--r--    1 kfn   user    710 Jul 23 13:52 Constants
-rw-r--r--    1 kfn   user    143 Jul 23 13:41 Create.day
-rw-rw-r--    1 kfn   user    117 Jul 23 13:41 Mission.nam
-rw-rw-r--    1 kfn   user     87 Jul 23 13:41 Status
-rw-r--r--    1 kfn   user    268 Jul 23 13:41 Tiers
drwxr-xr-x    4 kfn   user     69 Jul 23 13:53 b_to_b
drwxr-xr-x    2 kfn   user     77 Jul 23 13:52 blocks
drwxr-xr-x   95 kfn   user   4096 Jul 23 13:54 dems
drwxr-xr-x    2 kfn   user     56 Jul 23 13:55 gcps
drwxr-xr-x   95 kfn   user   4096 Jul 23 13:52 map
drwxr-xr-x    2 kfn   user     57 Jul 23 15:58 overlay
drwxr-xr-x   12 kfn   user   4096 Jul 23 15:54 sar
drwxr-xr-x   96 kfn   user   4096 Jul 23 13:57 tiles
drwxr-xr-x    2 kfn   user      9 Jul 23 13:41 tmp
```

8.3 Special Overlays

Special overlays include high resolution coastline and the boundary area. The boundary area needs only be copied if no map is display initially.

From Polestar:

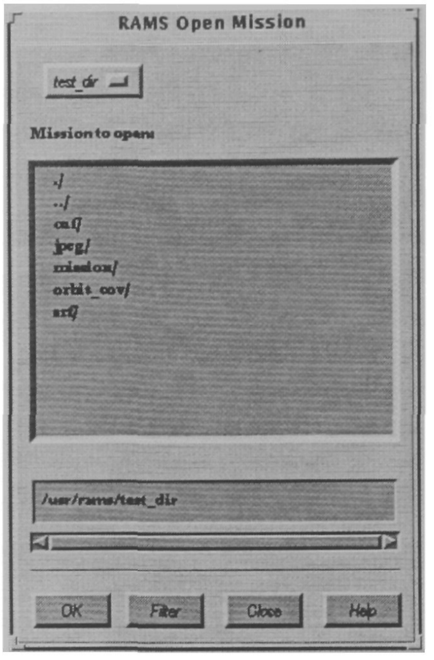
- *cp /data2/vexcel/rams/data/boundary.area /data1/pub/amm/plan_tool/day01/overlay*
- *cp /data2/vexcel/rams/data/coast.plns /data1/pub/amm/plan_tool/day01/overlay*

From Southpole:

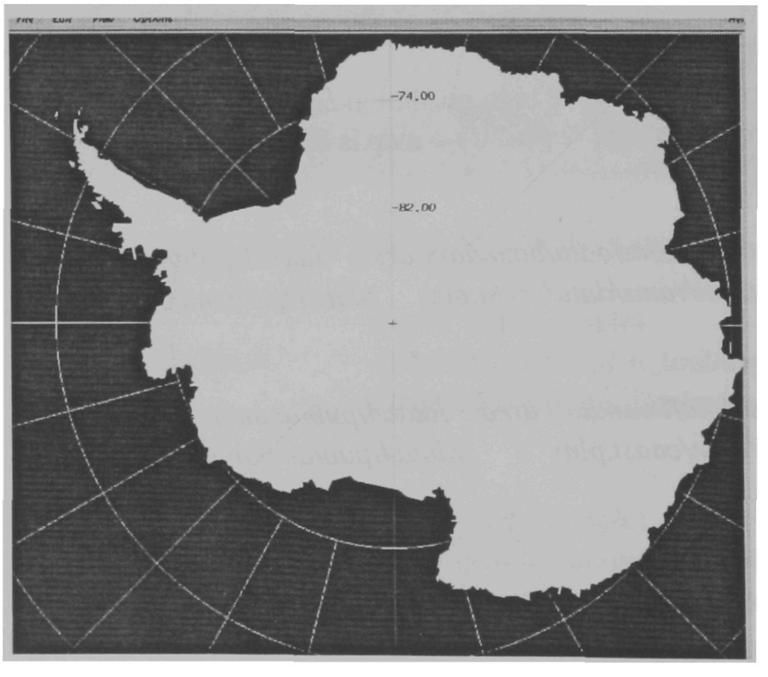
- *cp /usr/rams/data/boundary.area /data4/pub/amm/mission/day01/overlay*
- *cp usr/rams/data/coast.plns /data4/pub/amm/mission/day01/overlay*

8.4 Open a Mission.

- Click on **FILE, OPEN, MISSION** from the PlanningTool panel.
- At the bottom window type in: /data1/pub/amm/plan_tool/day01

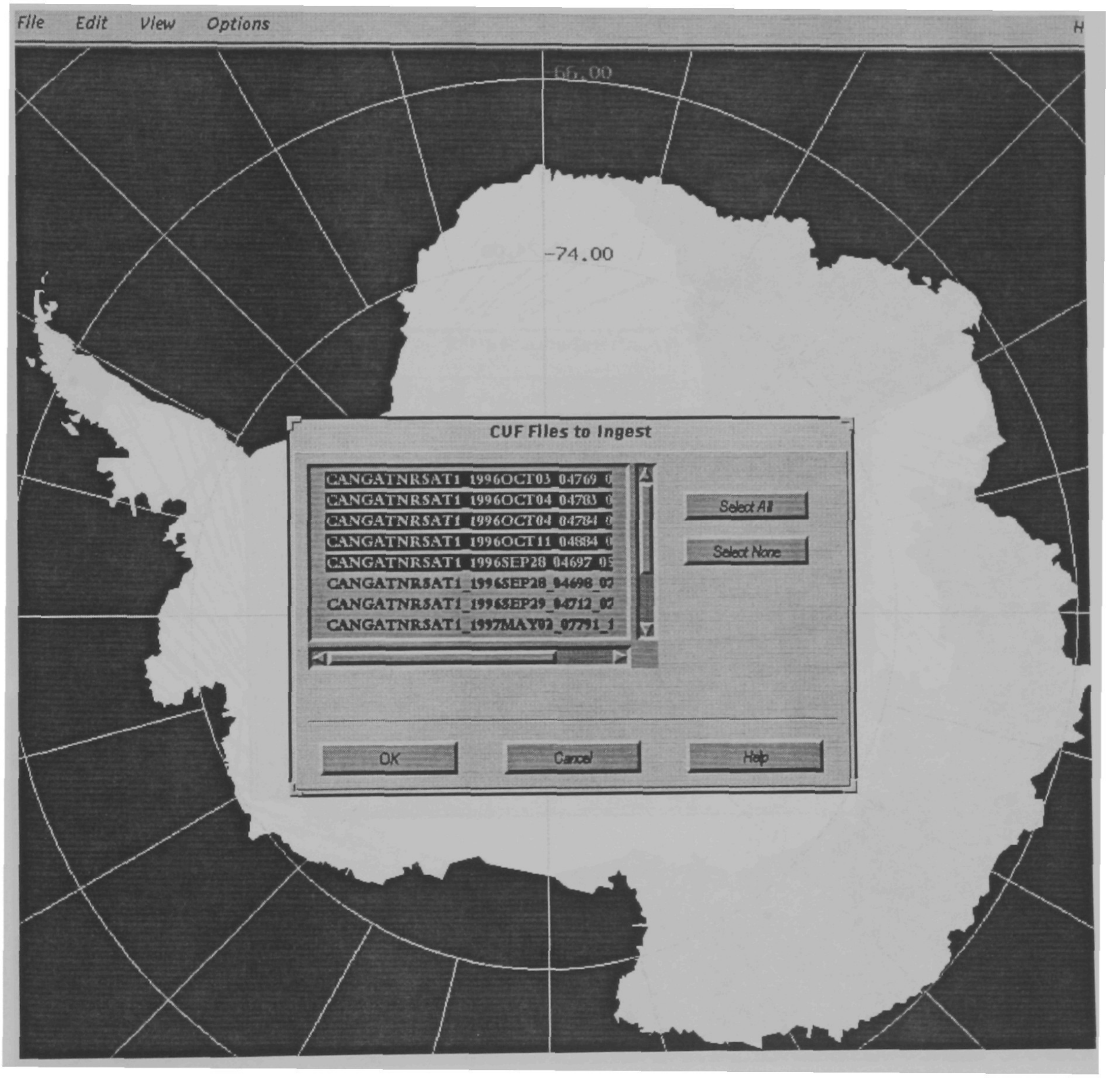


Once the mission is opened a boundary map will be displayed



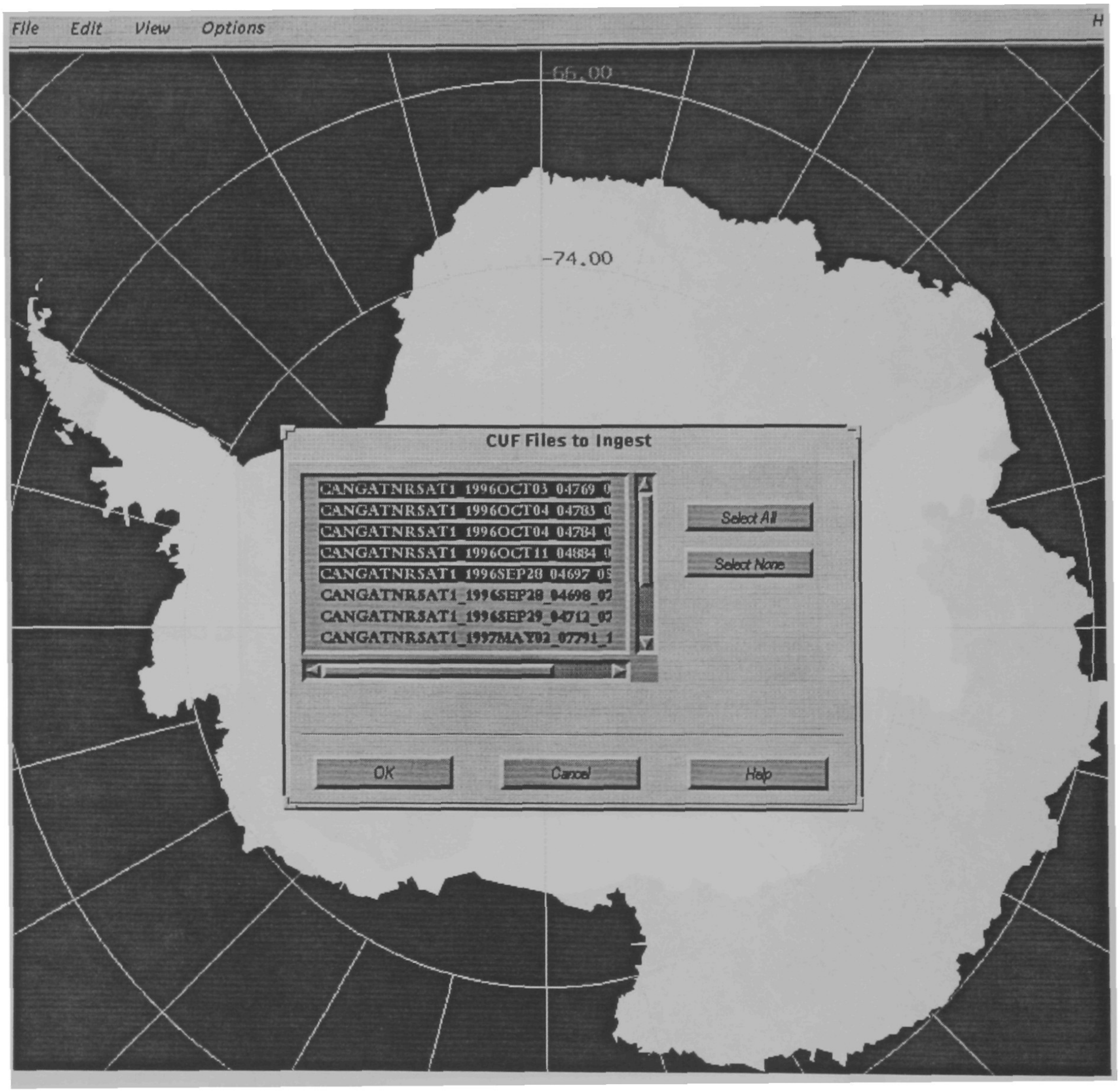
8.5 Ingesting CUF (or SRF)

- Click on **FILE, LOAD, INGEST CUF** (or Scan Results)
- Change directories to the directory that contains the CUF or SRF files and hit return to display the files.



- There are 3 ways to load CUF's

1. One at a time (click on desired file to highlight).
2. Select all (choose select all button)
3. In groups by clicking on multiple files to highlight.



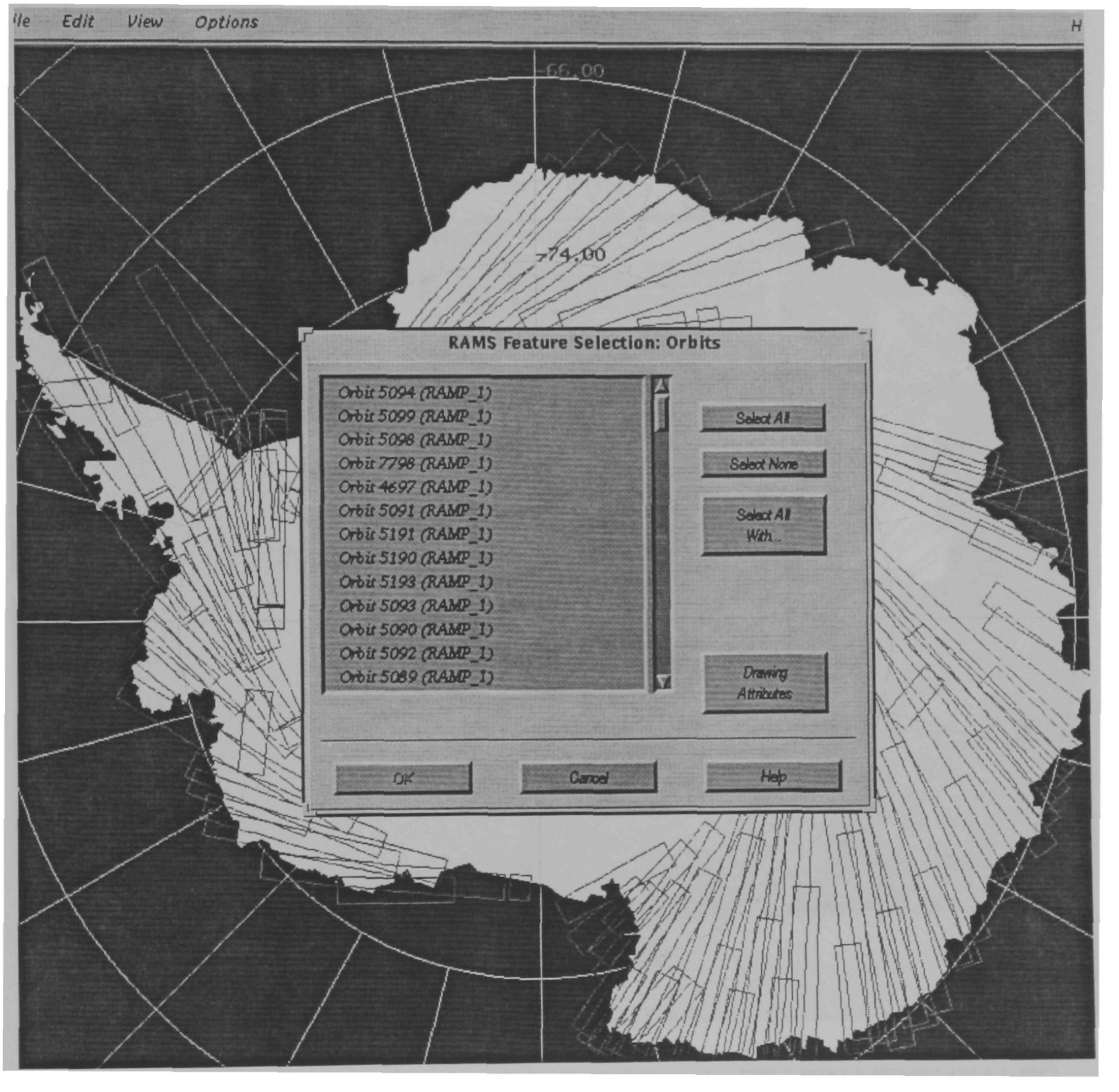
* note when "selected all" for 98 SRF's I ran into a ingest problem that resulted in orbit display errors. I suggest limiting the ingest number to no more than 50 at a time.

When multiple files are selected for ingesting (loading) this process will take a few minutes so be patient.

8.6 Display CUF/SRF

- Click on **VIEW, FRAMES or VIEW, ORBITS.**

The VIEW ORBITS takes less time to display than the VIEW FRAMES.

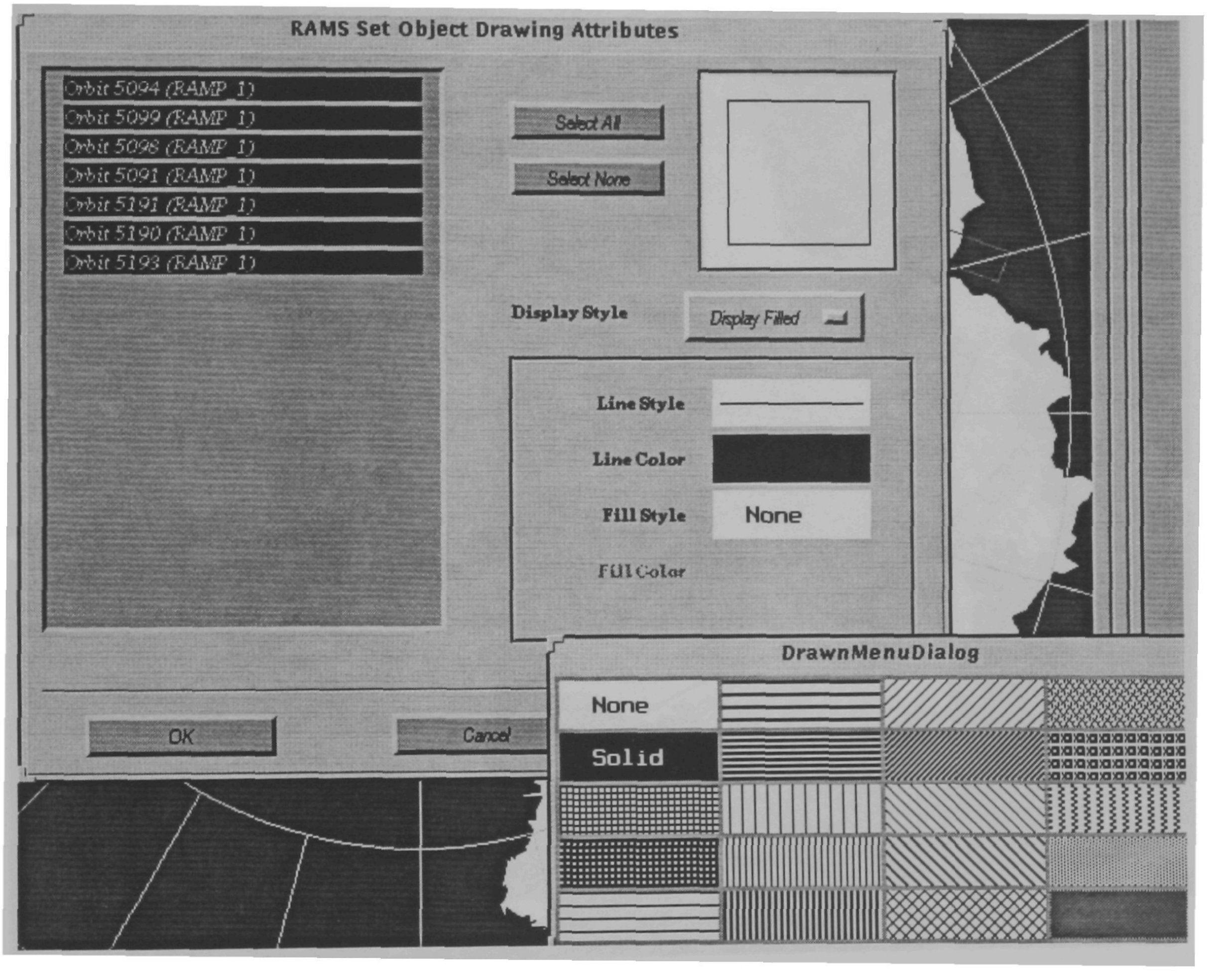


- By clicking on the orbit number displayed in the dialogue box that orbit will be highlighted in red on the map.
- By clicking on a particular orbit on the map, that orbit number will be displayed and highlighted in the dialogue box.

8.6.1 Drawing Attributes

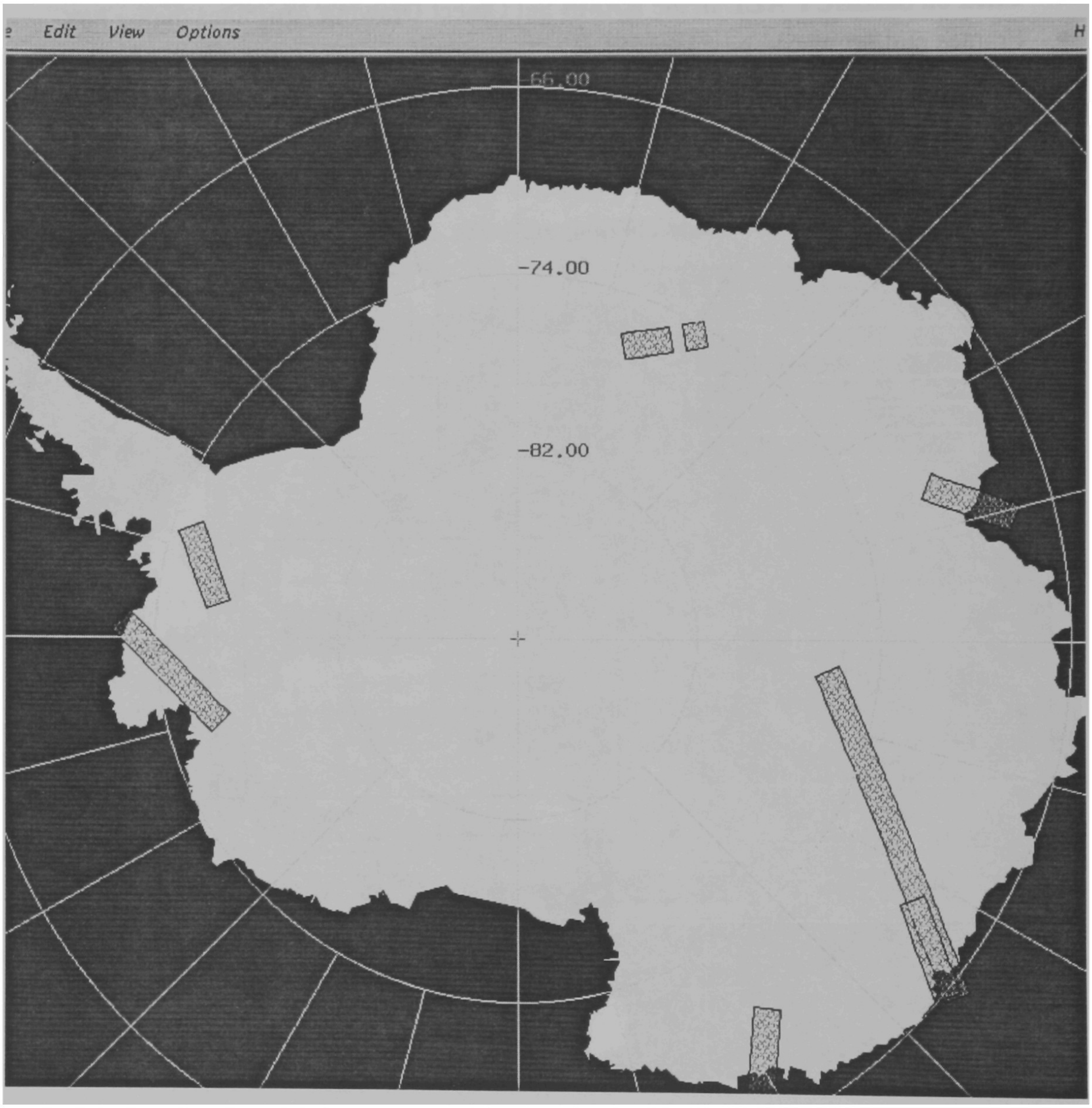
To change the drawing attributes for selected orbit/frames:

- Click on **DRAWING ATTRIBUTES**
- Click on **SELECT ALL** in the RAMS Set Object Drawing Attributes dialog box
- Frames and orbits can be displayed as outline or filled (this example will be filled)
- Right click in **FILL STYLE** and a DRAWN MENUE DIALOG box will appear
- Left click in the fill style you prefer.

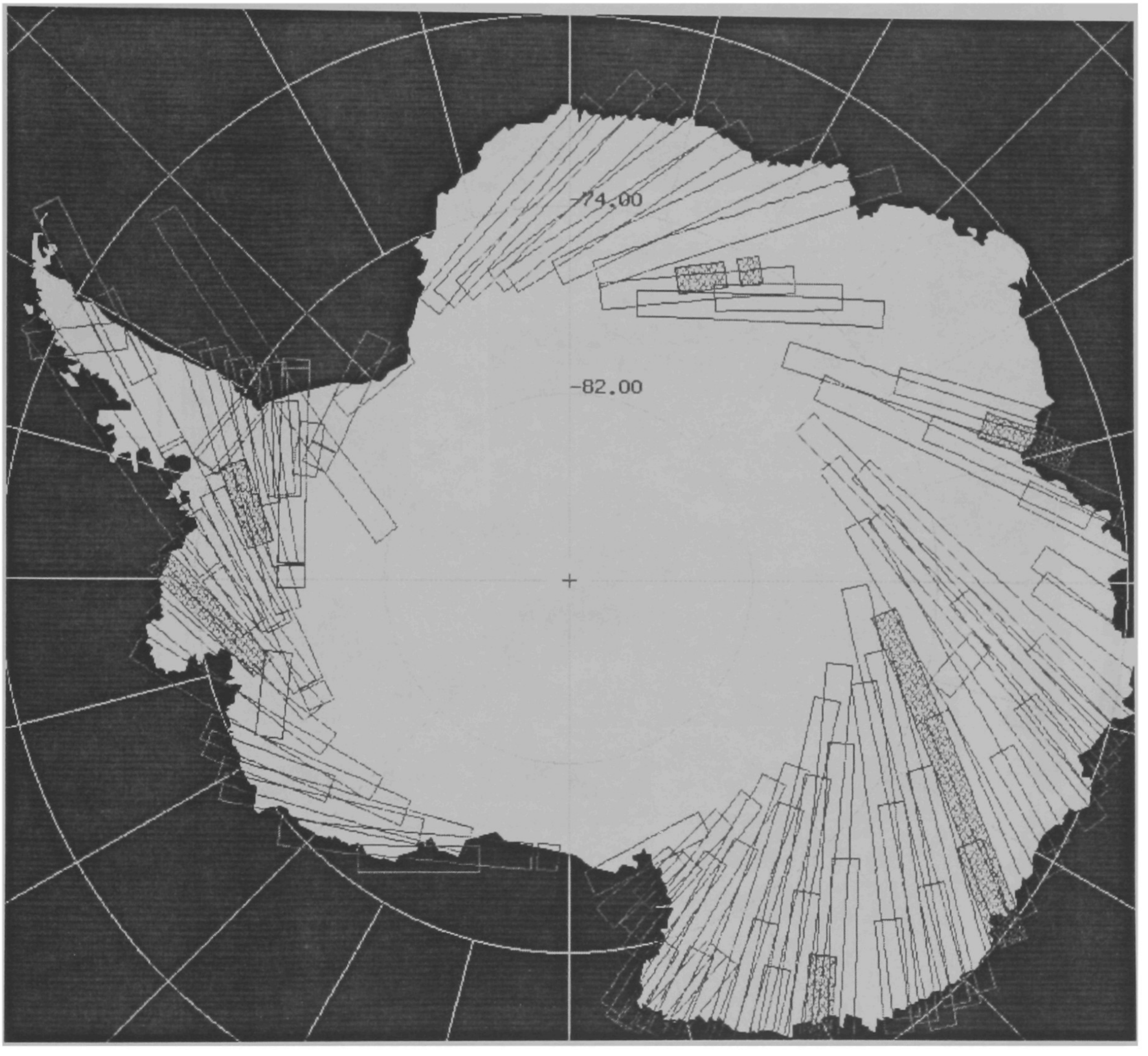


- To change the color, right click in **FILL COLOR** and a DRAWN MENU DIALOG box will appear.
- Left click in the color you prefer.
- Click **OK**.

- In the **RAMS FEATURE SELECTION**: **ORBITS** box click **OK** again. This will display the selected filled/colored orbits only.

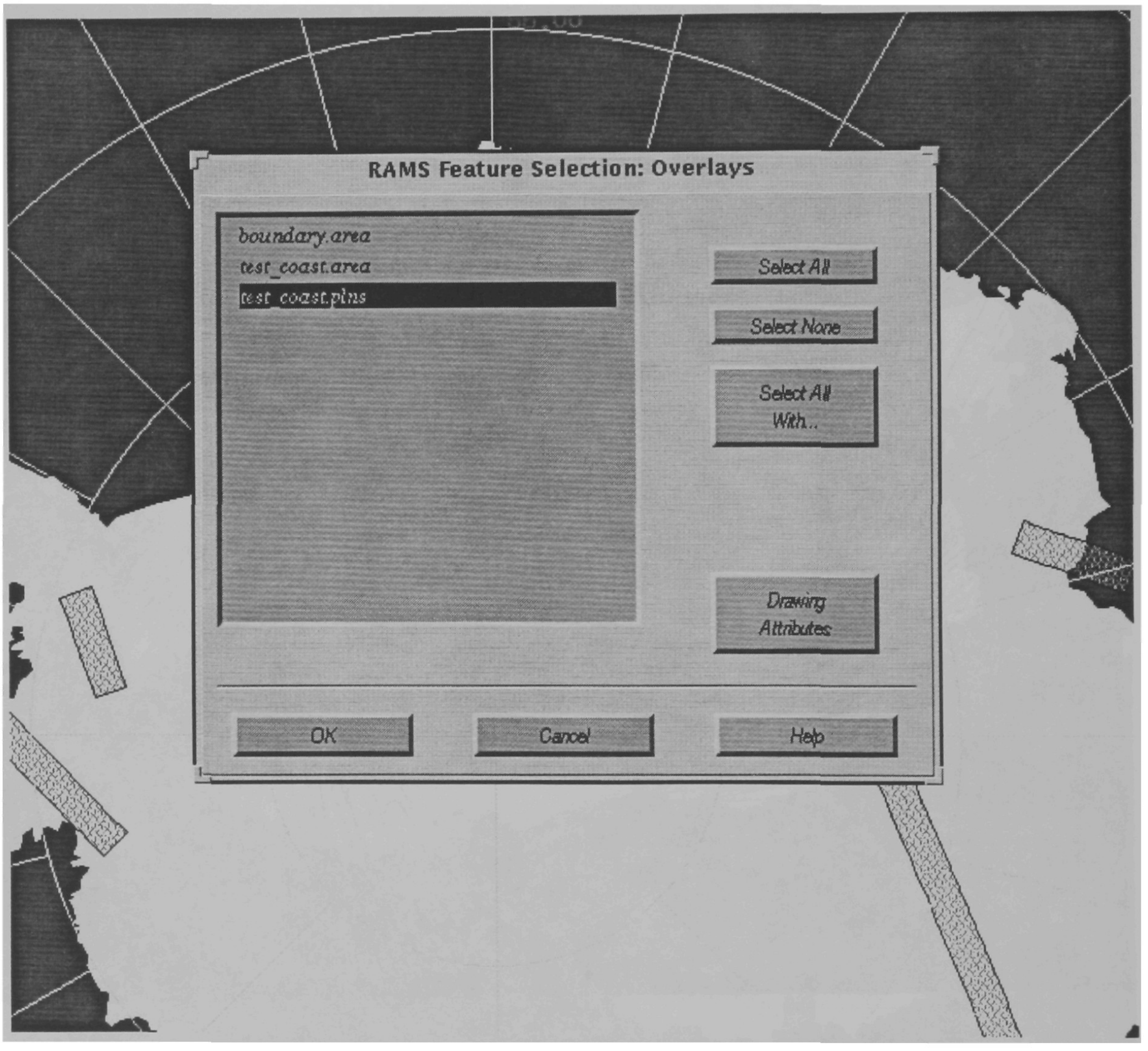


- By selecting **VIEW, ORBITS** from the PlanningTool panel again all the orbits will be visible plus the orbits selected for fill/color will be displayed.



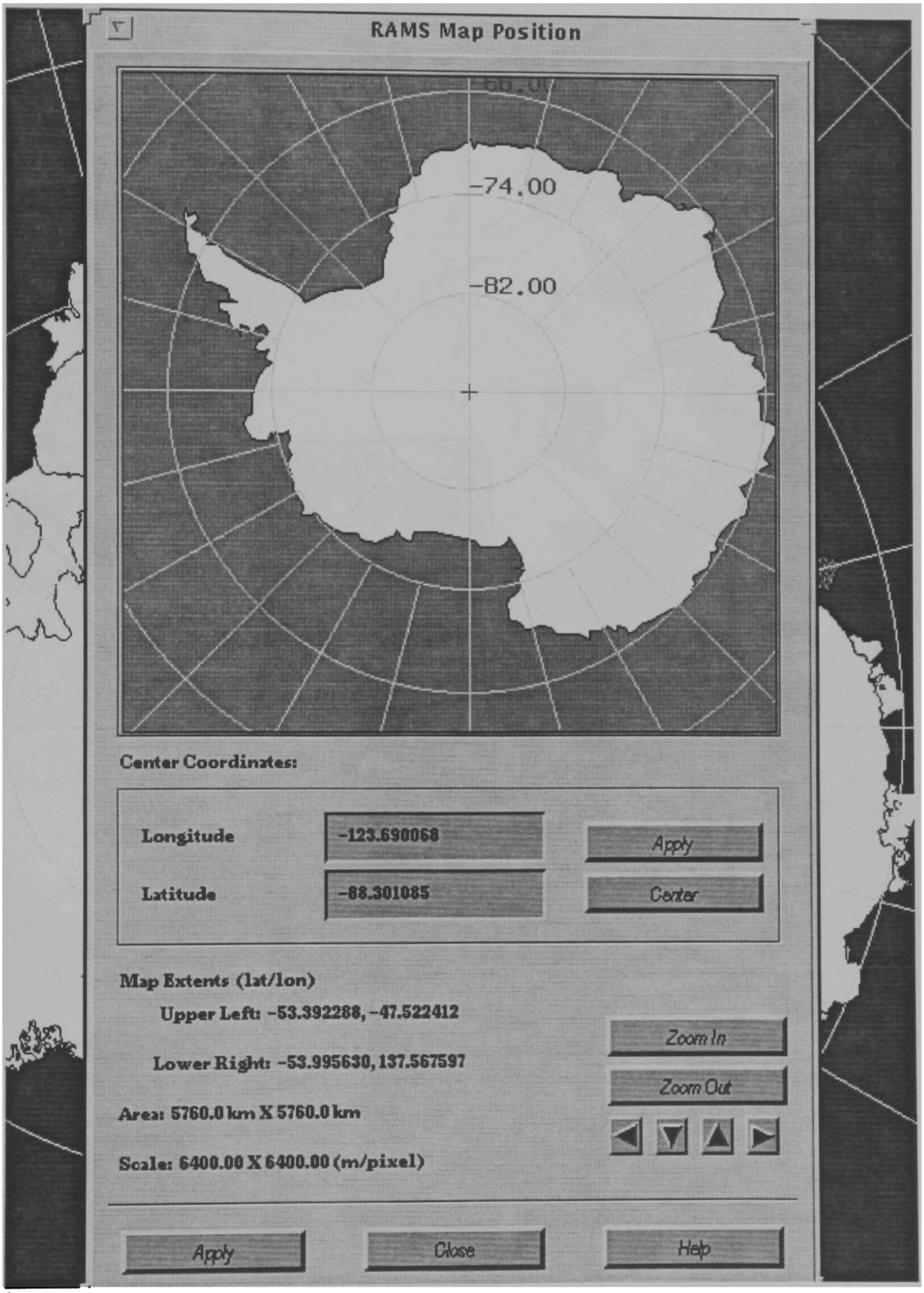
8.7 View an overlay

- Choose **VIEW, OVERLAY** from the PlanningTool panel
- Left click on desired overlay. This will take a couple of minutes to display on the screen.

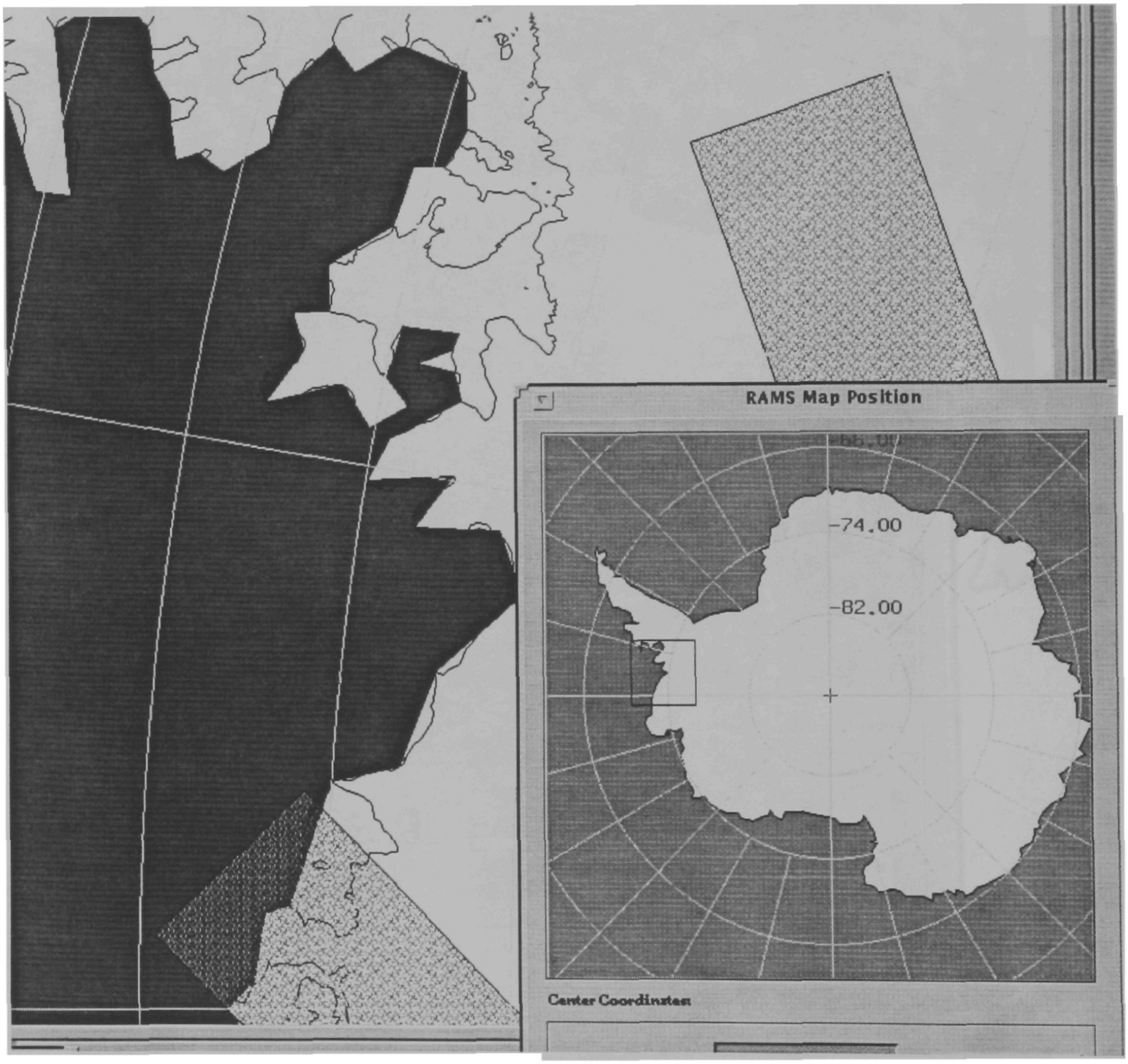


8.8 Zoom In

- Choose from the PlanningTool panel **OPTIONS, MAP AREA**



- Left click on **ZOOM IN**. A box will appear in the **RAMS MAP POSITION** dialog.
- To move the box you can click and drag or use arrow buttons.
- Then select **APPLY**.



Section 9: Sliver Checking User Manual

Katy F. Noltimier

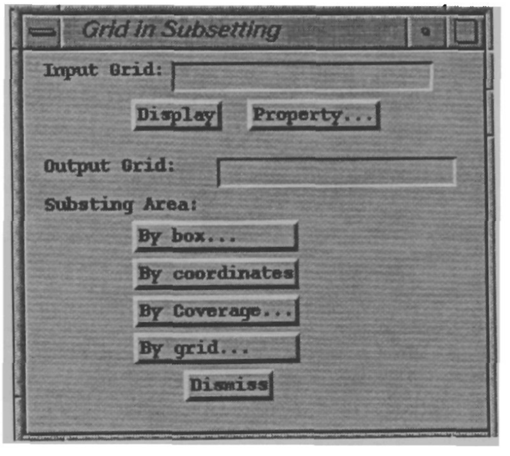
9.0 Introduction.

This manual describes how to perform sliver checking using geocoded images. See section 5 for JPEG mosaicking procedures. ASF QUICKLOOK images will be ingested into IMAGINE using ASF SAR-mosaicking tools and is not covered in this text. Once QUICKLOOK images are imported into IMAGINE the procedure will be the same.

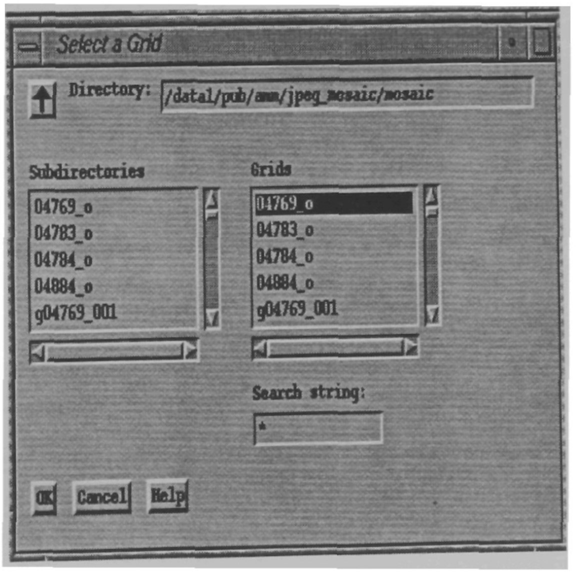
9.1 Subsetting Mosaicked Orbits

After all the orbits for one daily coverage are mosaicked together, subsetting can begin. Make sure the workspace is in /datal/pub/amm/sliver.

- From the ARC/INFO icon panel click on **DEM GENERATION** and **SUBSETTING GRIDS:**



- Right click in **INPUT GRID** to display the following:

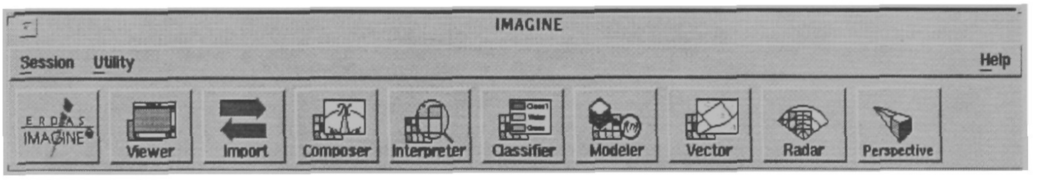


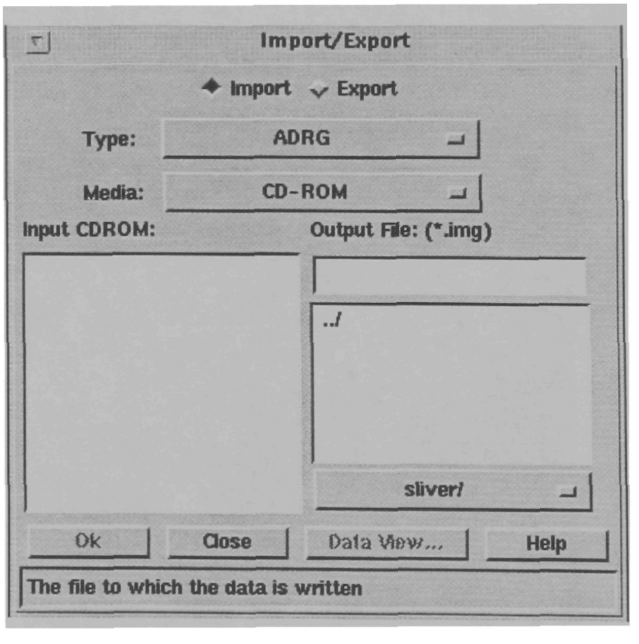
- Select the orbit you wish to subset
- Click **OK**
- Assign a name to the OUTPUT GRID such as s1_04769 (s for subset, 1 for orbit segment)
- Click on BY BOX
- Trace a box around the section of the orbit mosaic you wish to subset by positioning the cursor where you want to begin and left click, pull the box laterally across the image to the desired area and right click. This will automatically generate the subsetted output grid.

9.2 Importing into IMAGINE

Invoke IMAGINE from the directory you wish to write the IMG formatted mosaic segments. Because the GCP Editor in IMAGINE will not work with ARC/INFO Grid format, the subsetted grids must be imported into IMAGINE.

- From the IMAGINE icon panel click on IMPORT.

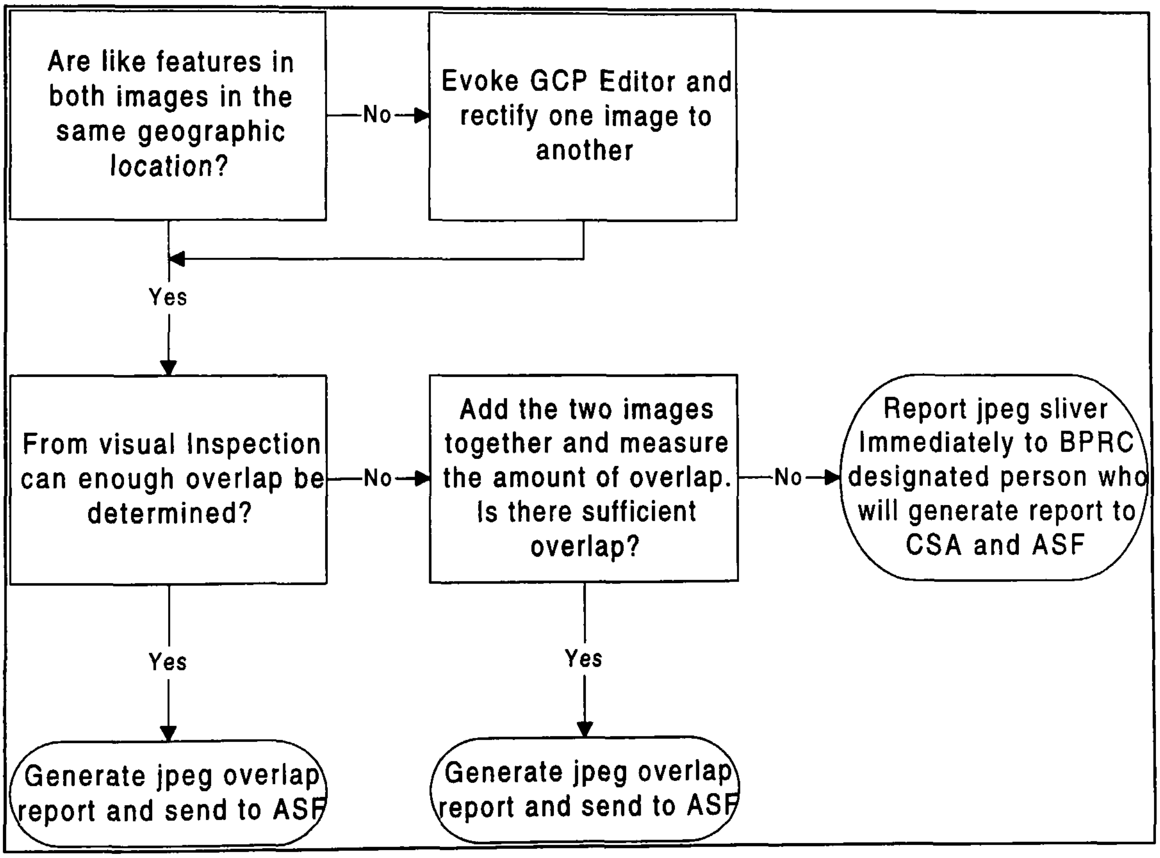




- Change the TYPE to GRID
- Change the MEDIA to FILE
- Click on one of the subsetted orbits. The output file will automatically be created with the same file name but with an *.img extension.
- Click OK
- Repeat this operation for all the subsetted orbits corresponding to a daily coverage.
- After the *.img file is created the corresponding GRID file can be removed. This HAS to be done using an ARC/INFO command.

9.3 Sliver Checking Procedure

SLIVER CHECKING FLOW CHART



9.4 Linking Viewers

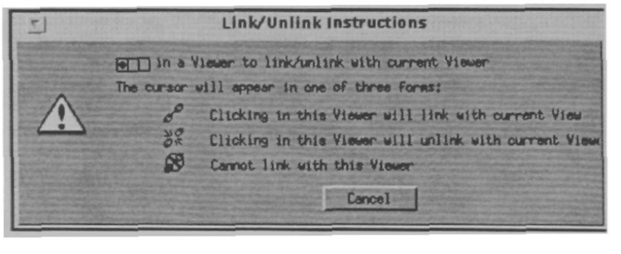
After geocoding and rectification is complete it is a good idea to double check the validity of the rectification.

9.4.1. Abbreviated Steps for Linking Viewers

1. Open two viewers and display the image pairs
2. From one of the viewer icon panels click on **VIEW, LINK/UNLINK, GEOGRAPHICAL**
3. At the prompt, position the cursor in the OTHER viewer and click
4. From one of the viewer icon panels, click on the crosshair icon
5. Crosshairs will be displayed in both viewers. The center of the crosshairs should represent the same geographical location. Test this by moving one of the crosshairs to a feature that is contained in both images to determine if the feature is in the same geographical place.

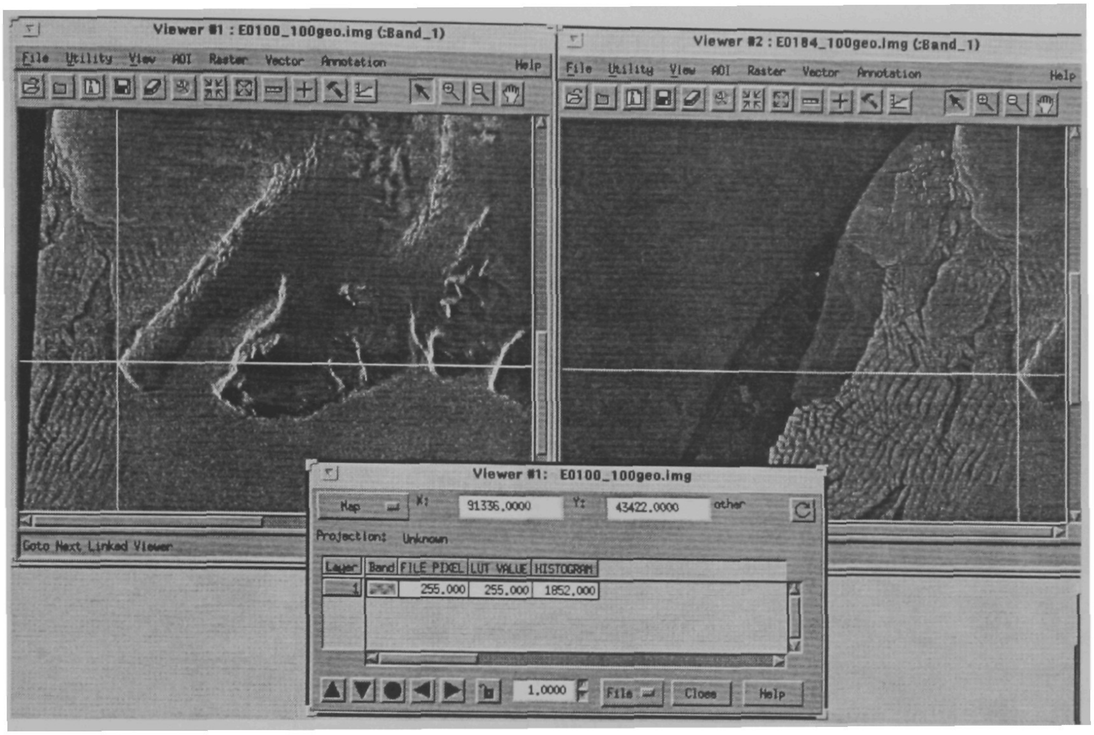
9.4.2 Linking Viewer Procedure

- Display both the geocoded and rectified images in the viewers.
- From one of the Viewer icon panels click on View, scroll down to Link/Unlink Viewers... and then select Geographical. This will evoke a Link/Unlink Instructions box.
- Place the cursor in the other viewer and click.



The viewers are now linked geographically.

- From the Viewer icon panel click on the inquire cursor icon. This will evoke crosshairs to appear in both viewer.
- With the cursor click on the center of one viewers crosshairs as you move it around the crosshairs in the opposite viewer will also move.
- Place the crosshairs on like features to verify that the rectification was successful.



9.5 GCP Editor

9.5.1 Abbreviated Steps for GCP Editor

1. Open two viewers and display image pairs
2. Assign the viewer on the left as the **DESTINATION** viewer and the view on the right as the **SOURCE** viewer.
3. From the SOURCE viewer (right), left click on **RASTER, GCP EDITOR**
4. From the GCP Editor box left click on **PAIRWISE, SELECT VIEWER** and at the prompt click in the **DESTINATION** viewer (left).
5. From the GCP Editor box click on **SOURCE, SHOW CLIP EXTRACTION VIEW**.
6. From the GCP Editor box click on **DESTINATION, SHOW CLIP EXTRACTION VIEW.**
7. From the GCP Editor box click on the **CREATE GCP** icon  and position it over a feature that is identifiable on both images in the SOURCE Viewer Chip. Then repeat this in the DESTINATION View Chip (for the same feature). Continue for at least 4 GCP points.
8. Click on **CALCULATE TRANSFORM** icon . The key is to obtain a low RMS error.
9. From the TRANSFORM Editor box click on the **DISPLAY RESAMPLE LOG** icon  to display the RESAMPLE dialog box

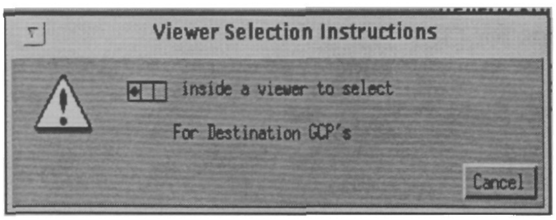
10. Make sure the X and Y values for the Output Cell Sizes equals the ground resolution of the original image (if not, change it).
11. Select the **OPEN FILE** icon from the RESAMPLE box and select the directory into which you wish to write the rectified image and assign an output file name using the DESTINATION image orbit number such as (s2_04784geo.img).
12. Click **OK.**
13. Display the newly rectified image in the DESTINATION viewer.
14. Repeat steps in section 9.4.

9.5.2 GCP Editor Procedure

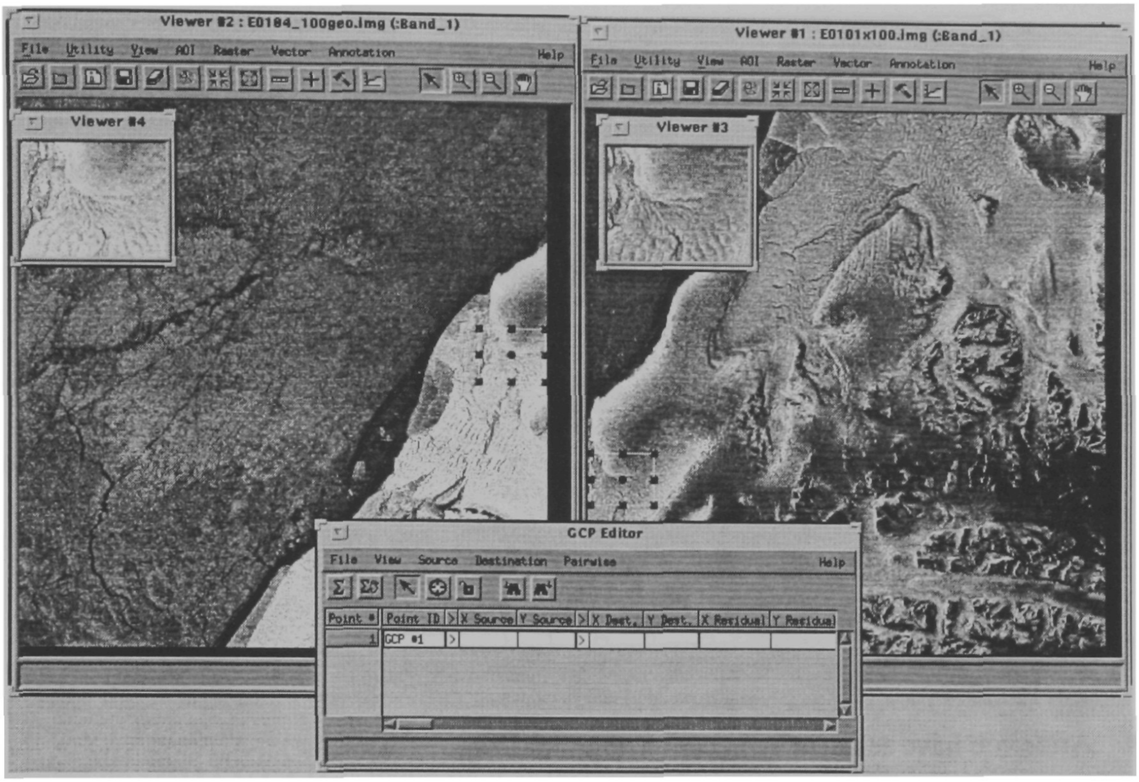
Open two viewers and display the newly geocoded image and the image to be rectified. For this procedure the images will be referred to as:

Newly geocoded image = DESTINATION
Image to be rectified = SOURCE

- From the Viewer icon panel of the SOURCE image (image to be rectified), left click on **Raster,** scroll down and select **GCP Editor.**
- From the **GCP Editor** box, left click on **Pairwise**, scroll down and select **Select Viewer**. This will prompt a **View Selection Instructions** box to appear.

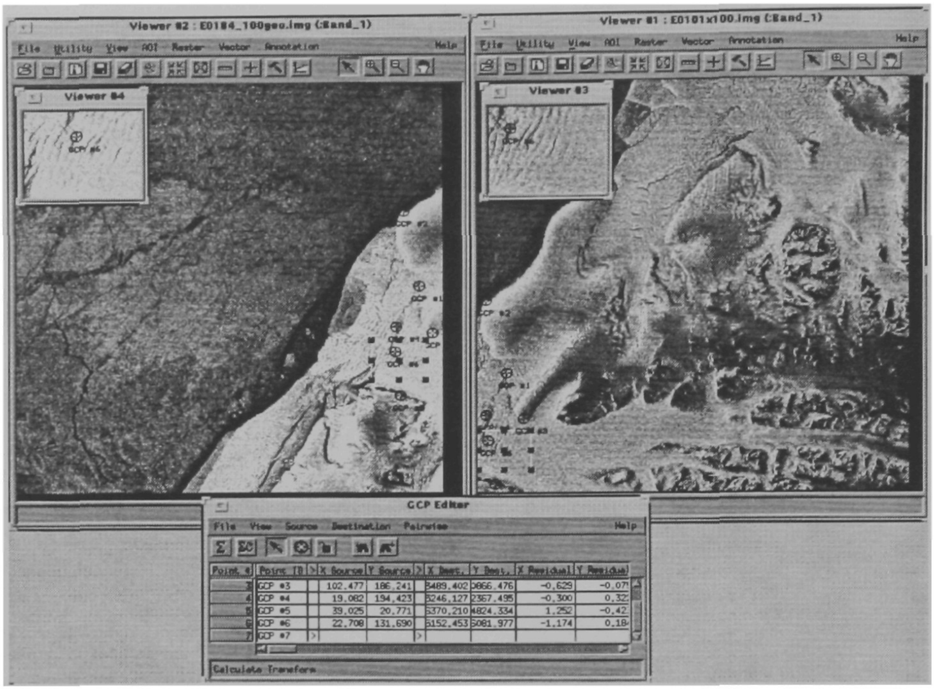


- Left click in the DESTINATION (geocoded image) Viewer. This will link the two viewers and display the X- and Y-SOURCE and X- and Y-DESTINATION columns in the **GCP Editor**.
- From the **GCP Editor** box click on **SOURCE**, scroll down and select **Show Clip Extraction View**. This will display a Viewer Chip that is linked to the SOURCE image viewer along with View Finder that resides in the SOURCE image viewer.
- From the **GCP Editor** box click on **DESTINATION**, scroll down and select **Show Clip Extraction View**. This will display the Viewer Chip and View Finder.

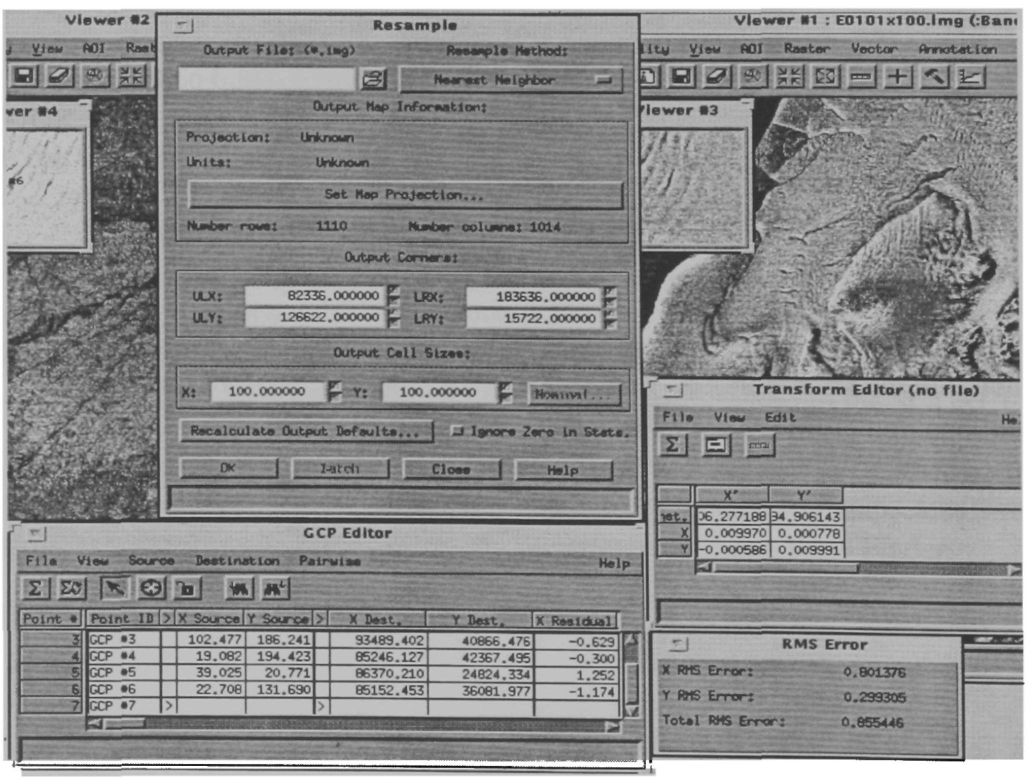


- Position the View Finders over an area that contains the same feature in both images (as illustrated in the previous example). The area of interest will be magnified in the Viewer Chips.
- From the **GCP Editor** box click on the create GCP icon and position it over an identifying point on the feature (such as an edge, intersection, point) in the SOURCE Viewer Chip and click. This will place a GCP#1 identifier in that location and the coordinates for that location will be automatically entered in the GCP Editor X- and Y-SOURCE columns. You must select the feature in the SOURCE viewer first.
- Click on the create GCP icon again and position it over the exact same identifying point in the DESTINATION Viewer Chip and click. This will place a GCP#1 identifier in that location and the coordinates for that location will be automatically entered in the GCP Editor X- and Y-SOURCE columns.
- Continue doing this for a minimum of 4 GCP points.

This will look something like:



- After you have selected as many GCP points as possible, click on the calculate transform icon Σ. This will display the transformation matrix box and the rms error. The RMS error must be very small (< 1) to obtain a good rectification.



- From the **Transform Editor** box click on the display resample log icon to display the **Resample** dialog box.
- Make sure the X and Y values for the **Output Cell Sizes** equals the ground resolution of your image.
- Select the open file icon from the **Resample** box and select the directory into which you wish to write the "rectified" image and assign an output file name. I suggest using the same name with an *geo extension.
- Click on **Okay** to complete transformation/rectification process.

9.6 Adding Images

9.6.1 Abbreviated Steps for Adding Images

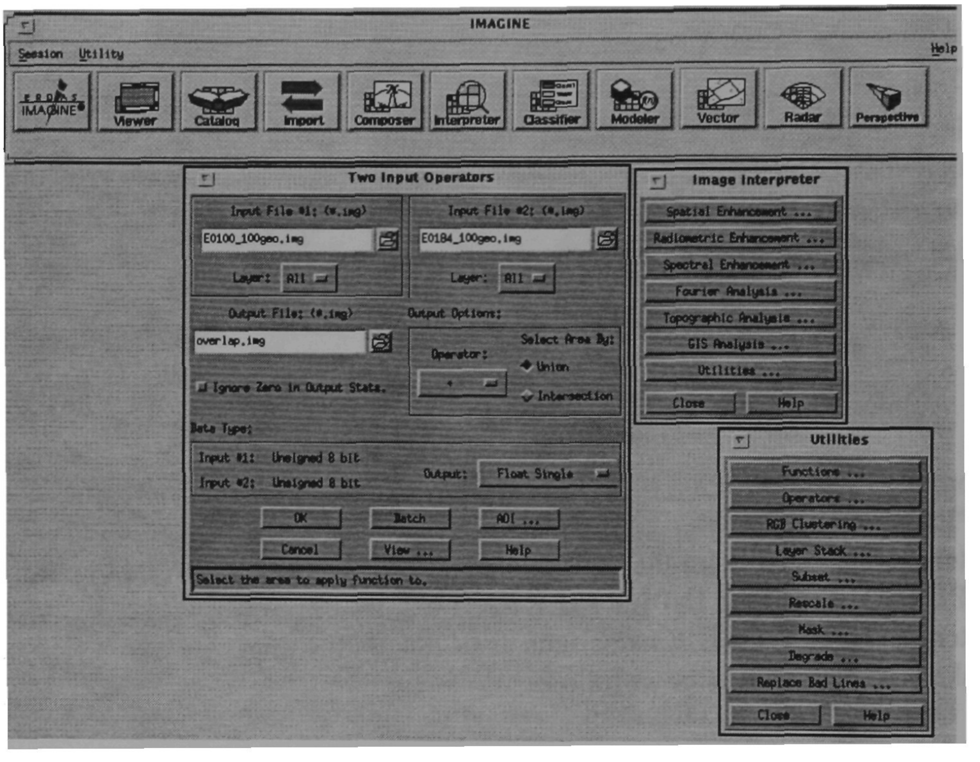
1. From the IMAGINE Icon Panel click on **INTERPRETER, UTILITIES, OPERATORS**
2. Enter the image pairs (or the Source and NEWLY rectified DESTINATION) in the **INPUT FILE #1 and INPUT FILE #2.**
3. Enter an **OUTPUT FILE** name such as 04784_04884.img.
4. Make sure the settings are as follows
   Operator is **+**
   Select area is **UNION**
   Output is **UNSIGNED 8-BIT**
5. Click **OK**

9.6.2 Adding Images Procedure

After verification that the two images are geo-referenced, measurement of the percentage of overlap must be calculated. I suggest adding (or subtracting if the images are overly bright) the two images together. This will result in the overlapping area to be much brighter then the non-overlapping areas (or vice versa if subtracting).

- From the ERDAS IMAGINE icon panel click on the **Interpreter** icon, scroll down and select **Utilities**.
- From the **Utilities** box select **Operators**. This will evoke a **Two Input Operators** box.
- Click on the open file icon under **Input file #1** and type in the directory and filename of one of the geo-referenced images.
- Do the same for **Input file #2**.
- Click on the open file icon under **Output file** and type in the directory and filename of the resultant added (subtracted) images.

- Make sure the **Operator** is set for addition (+) (or subtraction (-)), the **Select Area By** is set for **Union**, and the **Output** is changed from **Float Single** to **Unsigned 8-bit.**



- Click on **OK** for the operation to proceed.

When the operation is complete, display the added image in a viewer to verify that the overlapping areas are highlighted.

9.7 Measuring Overlap/Sliver

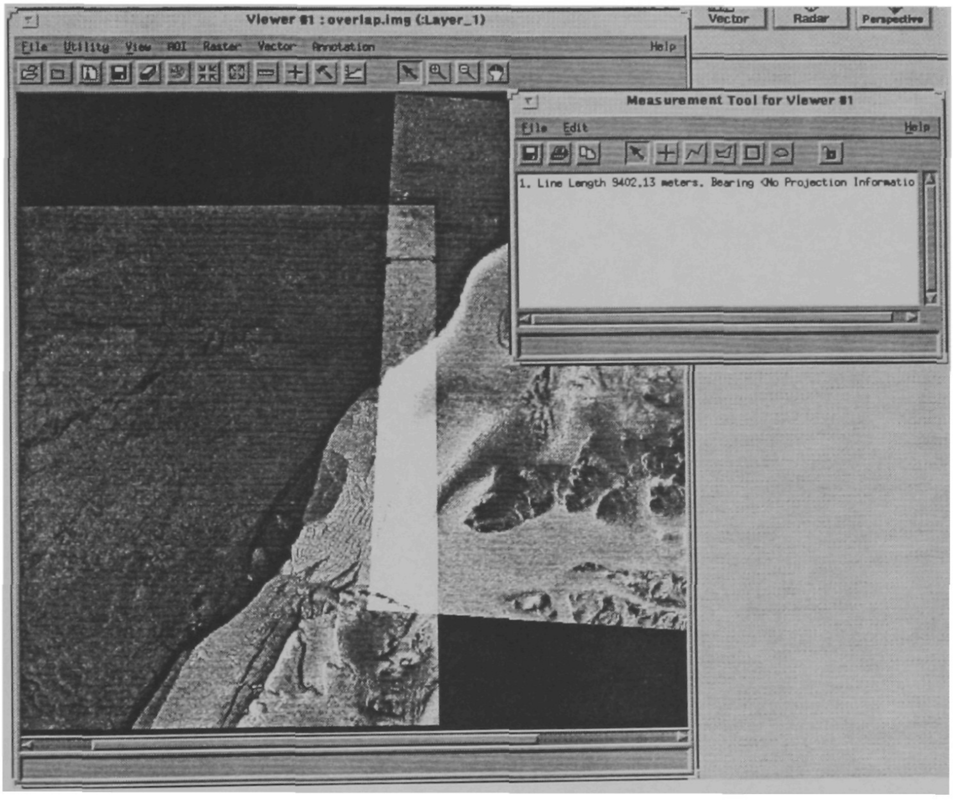
9.7.1 Abbreviated Steps for Measuring Overlap/Sliver

1. Display the "added" image pair in a viewer.
2. From the Viewer Icon Panel, click on **UTILITY, MEASURE**
3. Click on **EDIT, SET UNITS.** Make sure the length is set to METERS
4. Click on the **MEASURE LENGTH and ANGLES** icon . Place the cursor along the edge of the overlap, click and drag it over the the opposite edge **PERPENDICULAR** to the line of overlap. The length of overlap will be displayed in the Measurement box.
5. To obtain the percent of overlap:
   [(measured overlap)/ (#columns * ground resolution)]*100.

9.7.2 Measuring Overlap/Sliver Procedure

The final step is the actual measurement of the overlapped area and calculation of the percentage of overlap.

- From the View Icon Panel click on **Utility**, scroll down and select **Measure**. This will evoke a **Measurement** box to appear.
- Click on **Edit**, scroll down to **Set Units** and make sure the **Length** is set to meters (I believe the default is inches).
- To make the measurement, click on the measure lengths and angles icon . Place the cursor along the edge of the overlap, click and drag it over to the opposite edge as illustrated below:



- The length of the line will be displayed in the **Measurement** box.
- Divide this number by the number of columns * ground resolution of the image to obtain the percentage of overlap.

Section 10: SPA Coverage Checking User Manual

Biyan Li
Katy F. Noltimier (editor)

10.0 Introduction

The SPA coverage checking procedure allows for detection of gaps in the orbit plan.

10.1 Login

Use the amm login and password. Change directories to:

Southpole:

/data4/pub/amm/spa_check

Polestar:

/data1/pub/amm/spa_check

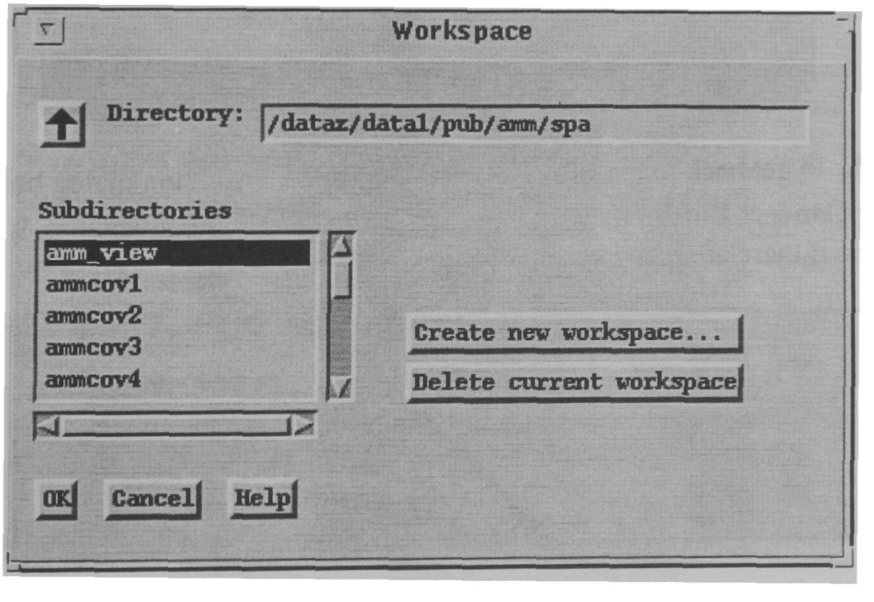
10.2 ARC/INFO

From the directory you wish to write output files in evoke ARC/INFO:

>Arc
>&r /data0/liu/ramp/lhx (southpole)
>&r /ramp/liu/ramp/lhx (polestar)

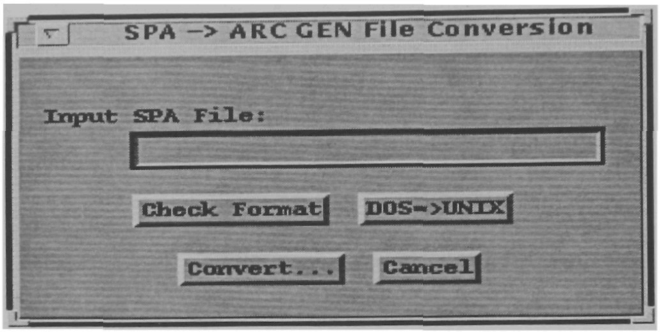
10.2.1 Change workspace

- From the ARC/INFO icon panel click on UTILITIES, WORKSPACE.
- Change the workspace (if needed) to the directory you wish to write output files.



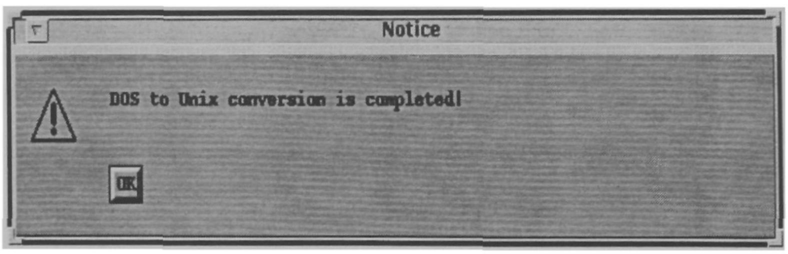
10.2.2 Convert SPA data into ARC/INFO Coverage

- From the ARC/INFO icon panel click **SatTrack, SPA to ARC REGION**.
- Right click the **Input SPA Files** box and select a *.exp file which is an exporting file from SPA.

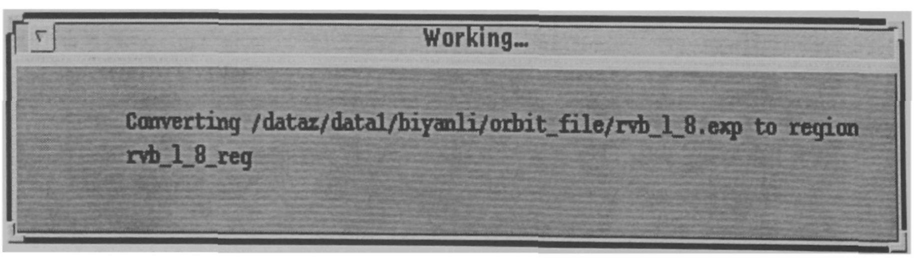


note: file name length can not be greater than 13 characters.

- Click on **"DOS=>Unix"** to convert the DOS SPA file to UNIX format file. When completed, a notice will be prompted as follows. .



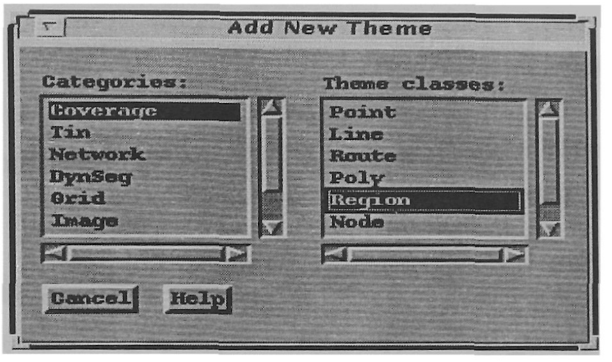
- Click **OK** to get back to the SPA --> ARC Gen File Conversion dialog box
- Click on **Convert Button** to invoke the SPA to ARC/INFO conversion. It might take some time if there are many swathes in the SPA file.



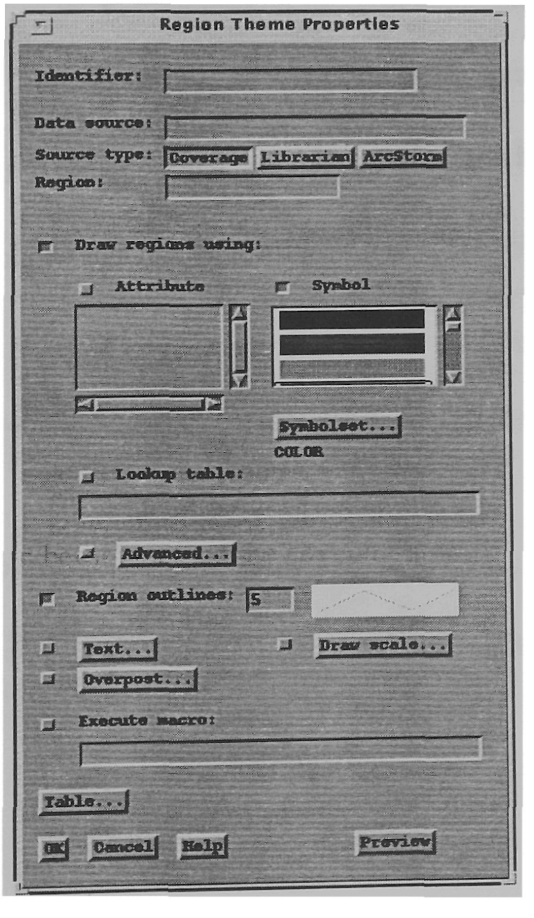
A regional coverage file will be created. The output file name will automatically be created using the input file name changing the *.exp* extension to *_reg*

10.2.3 Display the SPA coverage

- From the ARC/INFO icon panel, click on **VISULIZATION, NEW VIEW**.
- From the ADD NEW THEME dialog box, click **COVERAGE, REGION** to load the region coverage.



- From the REGION THEME PROPERTIES dialog box. Right click in the **DATA SOURCE** box and select the region coverage you wish to display.



- Select the shading color and the frame outline color, and then press **OK**. This coverage will be displayed in the left column of the theme management window.
- If the coverage needs to be displayed with coastline, click **COVERAGE, LINE** to load the coast line coverage.

SOUTHPOLE:

/data0/liu/add_database/av/scale3/coast

POLESTAR:

/data1/pub/amm/coast/coast30

- If the coverage needs to be displayed with layover polygons, click **COVERAGE, LINE** to load the layover polys.

SOUTHPOLE:

/data0/liu/jpc/layover

POLESTAR:

/data1/biyanli/orbit_file/layover_prj

- If the latitude and longitude needs to be displayed, click **MACRO, MACRO**

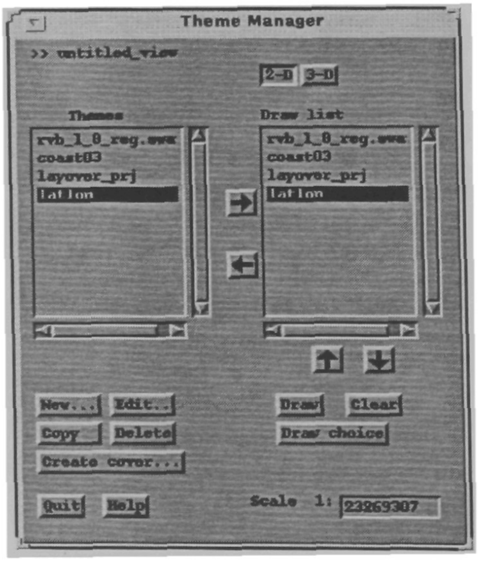
SOUTHPOLE:

/data0/liu/jpc/antlatlon.aml

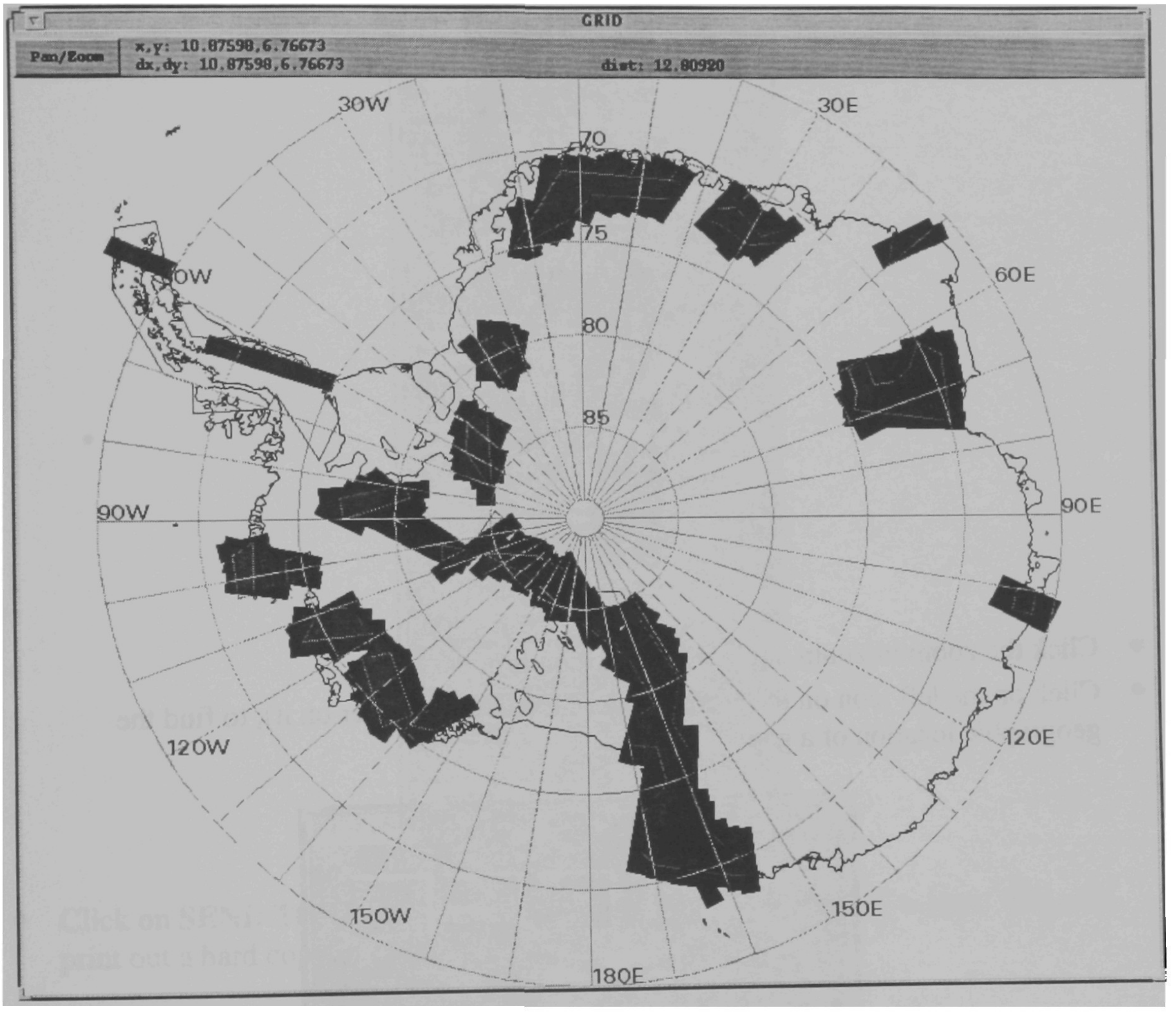
POLESTAR:

/data1/biyanli/data_covers/antlatlon.aml

- All the themes added will be displayed in the left column of the theme management window.
- Move the themes to the right in the theme management window, click **DRAW.**

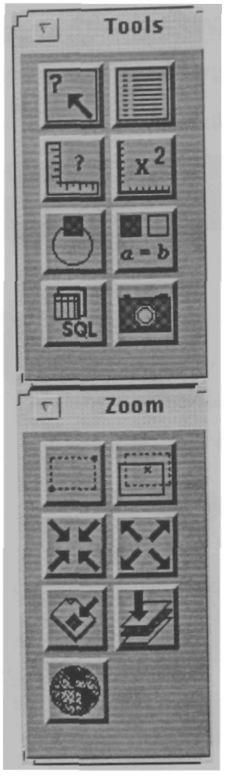


The result of the swath coverage overlaid with coastline, layover poly, latitude and longitude will be displayed as:

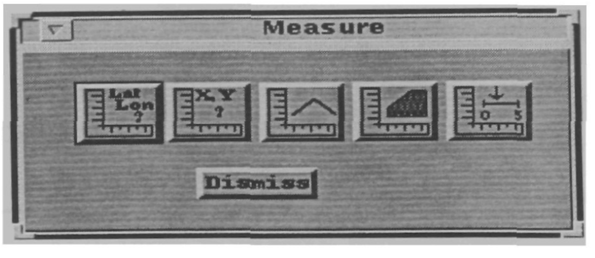


10.2.4 Checking SPA Coverage

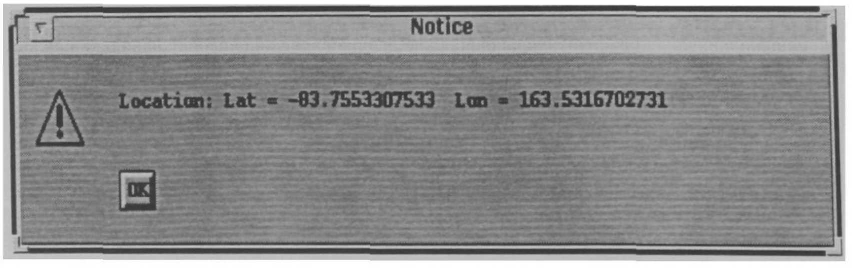
- From the ARC/INFO icon panel click VISUALIZATION, VIEW TOOL. A group of Icons will appear as follows:



- Click the zoom in/zoom out icons in the icon groups.
- Click on the left icon on the second row (the one with a ruler on it), to find the geographic location of a gap

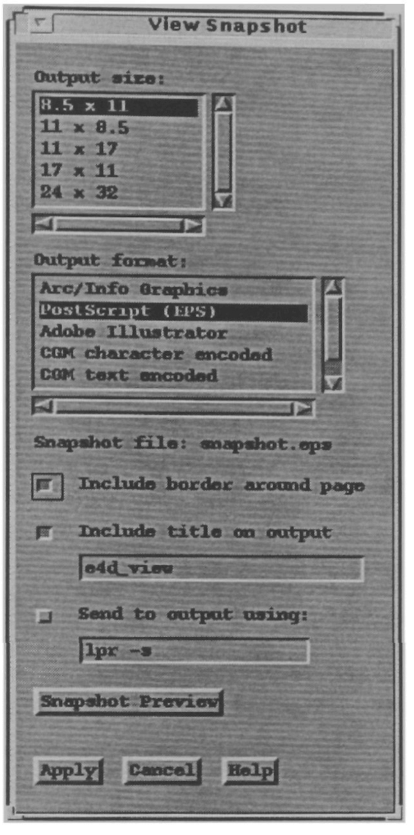


- Click on the first icon and point to the location of the gap. The latitude and longitude will appear on a notice box.



10.2.5 Print Out the View

- Click the Camera Icon in View Tool icon group and the following window will be shown on the screen:



- Click on **SEND TO OUTPUT** to print, then click on the **APPLY** button. This will print out a hard copy of the view.

- To create a graphics file of the view, de-select **SEND TO OUTPUT**.
- Click **APPLY**. This will generate an output file with the filename snapshot.eps. Make sure to change this name before making the next output.

10.2.6 Save View and Quit

- From the ARC/INFO icon panel, click **VISUALIZATION, SAVE VIEW** and specify a file name.

- Dismiss all the open windows and quit from view.
- From the ARC/INFO icon panel click on **QUIT**.

Section 11: Analysis

Katy F. Noltimier
Rick Forster
Hong Gyoo Sohn

11.0 Introduction

The analysis section is divided into three parts:

1. Fastscan Observations and Image Quality Assessment
2. Automatic Gain Control Verses Fixed Gain Analysis
3. Verification of Geometric Accuracy for SPA, QL, and ASP

11.1 Fastscan Observations and Image Quality Assessment

Fastscan processes SAR signal data and enables the user to view browse-type images. It has the capability of producing visual images that scroll up or down a computer screen for initial visual inspection. In addition several product files are created. For the purposes of the AMM image "jpeg" and text "cuf" (catalog update files) are of interest.

11.1.1 Check List

A check list was created to assist in data management of satellite downlinks (Figure 11.1). The check list comprises SPA predicted orbit information, Fastscan data information, and Fastscan image quality check. SPA predicted orbit information will be supplied in advance and needs to be recorded (in advance) for the respective satellite receiving stations. The Fastscan data information will be obtained at the time the satellite downlinks the signal data from its onboard recorder (these times should also be known in advance). **Any deviation between the SPA and FASTSCAN start times and duration times must be reported immediately.**

Fastscan image quality check is the visual inspection of the images as they scroll up or down the computer monitor. There are four main image quality features:

1. data drop outs
2. ghosting effects
3. horizontal lines
4. banding effects.

11.1.2 Data Drop Outs

Of critical importance is the identification of data drop outs. Data drop outs are missing data that show up as black sections in the images. This could be due to an error in the satellite on/off times that results in missing image data at the beginning or end of the orbit (this can be verified by comparing the Fastscan data information start time and duration time with the SPA predicted orbit information (Figure 11.1)). In addition, data drop outs could be the result of a satellite malfunction that would cause a gap in the image data. **Data drop outs must be reported immediately.**

11.1.3 Ghosting Effects

Ghosting effects result in the double imaging of a feature in an image (Figure 11.2). Residual ghosting effects have been observed on Alaska SAR processed (ASP) images and need to be documented if visible on the fastscan images. If such effects are visible during the fastscan visual inspection, the approximate time (or times) and any applicable comments need to be recorded. The time(s) are obtained from the fastscan monitor as the images scroll by.

Examples of comments would be:
1. Ghosting affects the first 50% of orbit (start time and end time)
2. Ghosting shows up periodically through orbit (approximate times they show up)
3. Ghosting only mildly affects image quality (how often & times)
4. Ghosting badly distorts image quality (how often & times)

11.1.4 Horizontal Lines (across track)

Horizontal lines (HL) are lines that run horizontally across track through an image (Figure 11.3). Residual lining effects have been observed on Alaska SAR processed (ASP) images and need to be documented if visible on the fastscan images. If such lines are visible during the fastscan visual inspection, the approximate time (or times) and any applicable comments need to be documented. The time(s) will be obtained from the fastscan monitor as the images scroll by.

Examples of comments would be:
1. HL's effect the first 50% of orbit (start time and end time)
2. HL's show up periodically through orbit (approximate times they show up)
3. HL's only mildly effect image quality (how often & times)
4. HL's badly distort image quality (how often & times)

11.1.5 Banding Effects

Banding effects appear as alternating light and dark bands across an image (Figure 11.4). Residual banding effects have been observed on Alaska SAR processed (ASP) images and need to be documented if visible on the fastscan images. They will usually appear where there is an abrupt change in brightness from one area to another in a scene (e.g., from dark to light) and has a slanted geometry (runs at an angle across the image). If banding is visible during the fastscan visual inspection, the approximate time (or times) and any applicable comments need to be documented. The time(s) will be obtained from the fastscan monitor as the images scroll by.

Examples of comments would be:
1. Banding effects the first 50% of orbit (start time and end time)
2. Banding shows up periodically through orbit (approximate times they show up)

11.1.6 Gatineau verses Prince Albert Fastscan Products

A comparison of Fastscan products from the same signal data were made between those generated at the Gatineau Satellite Station and those generated at the Prince Albert Satellite Station (Figure 11.5). The Fastscan "jpeg" images were identical and the Fastscan "cuf" files were identical.

Gatineau Downlink Check List
Data handler: Katy Noltimier
TEL# (819) 827-3791
FAX# (819) 827-4638
email: outgoing only

Tape I.D. Number:________________
Fed Ex Airbill #:________________

Date:________________
Downlink time:________________

SPA Predicted Orbit #____________

Acquisition Date	
Start (Acquisition) **Time**	
Orbit Duration	
Orbit Number	
Orbit Direction	
Beam Mode	

Fastscan Data Information

Acquisition Date	
Start (Satellite) **Time**	
Orbit Duration (End-Start Time)	
Orbit Number	
Orbit Direction	
Beam Mode	
Segment # (1 or 2)	

*****ANY DEVIATION BETWEEN SPA AND FASTSCAN START TIMES AND DURATION TIMES MUST BE REPORTED IMMEDIATELY *****

Fastscan Image Quality Check

	Yes	No	Times	Comments
Data Drop Outs				
Ghosting Effects				
Horizontal Lines				
Banding Effects				

ALL DATA DROP OUTS MUST BE REPORTED IMMEDIATELY

JPEG's and CUF's ftp to BPRC: ____________date ____________ time (local)

Figure 11.1. Example of check list to be used at the Gatineau Satellite Station.

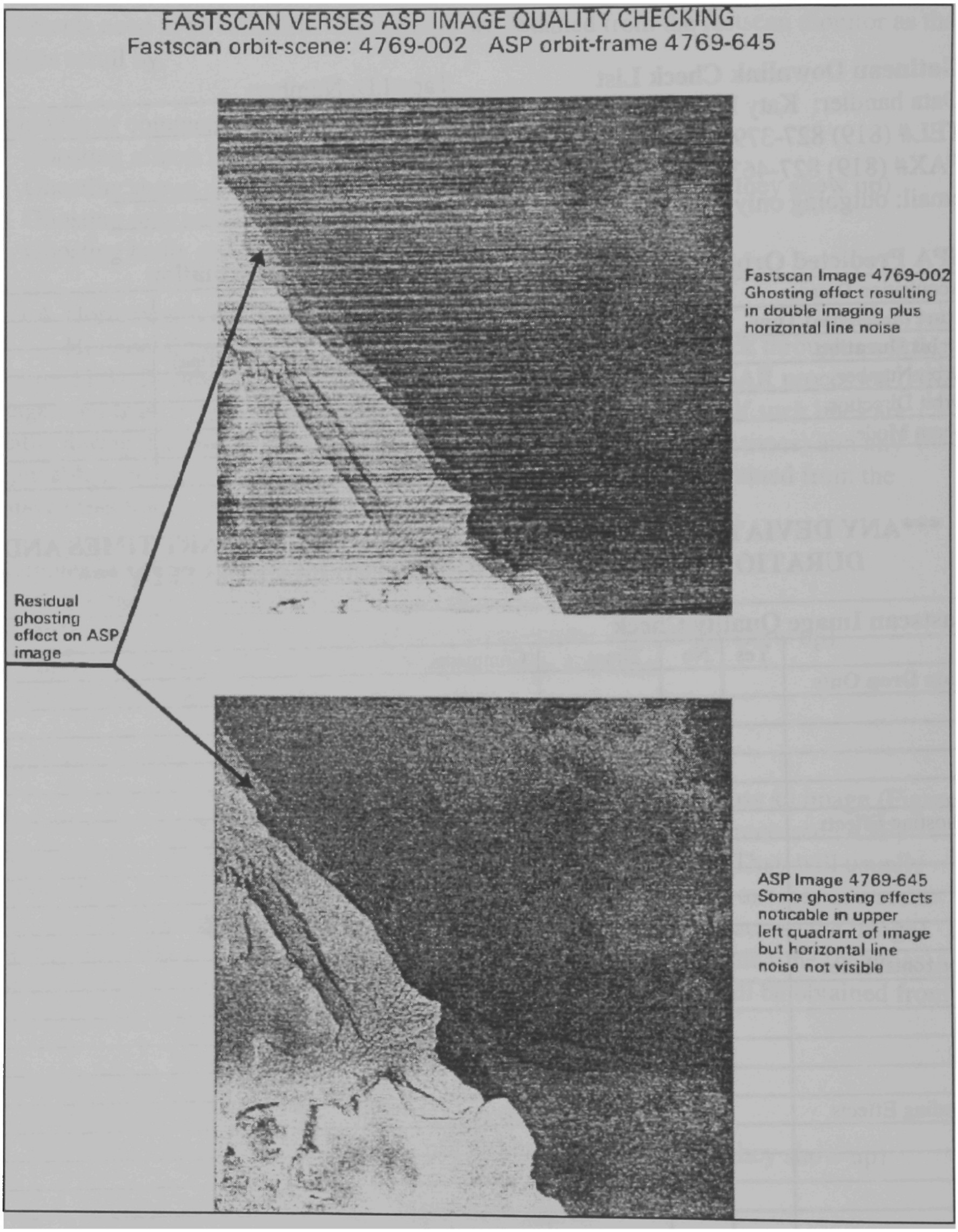


Figure 11.2. Example of ghosting effects on fastscan products and residual ghosting on Alaska SAR processed (ASP) image. Notice there are no residual horizontal lines on ASP image.

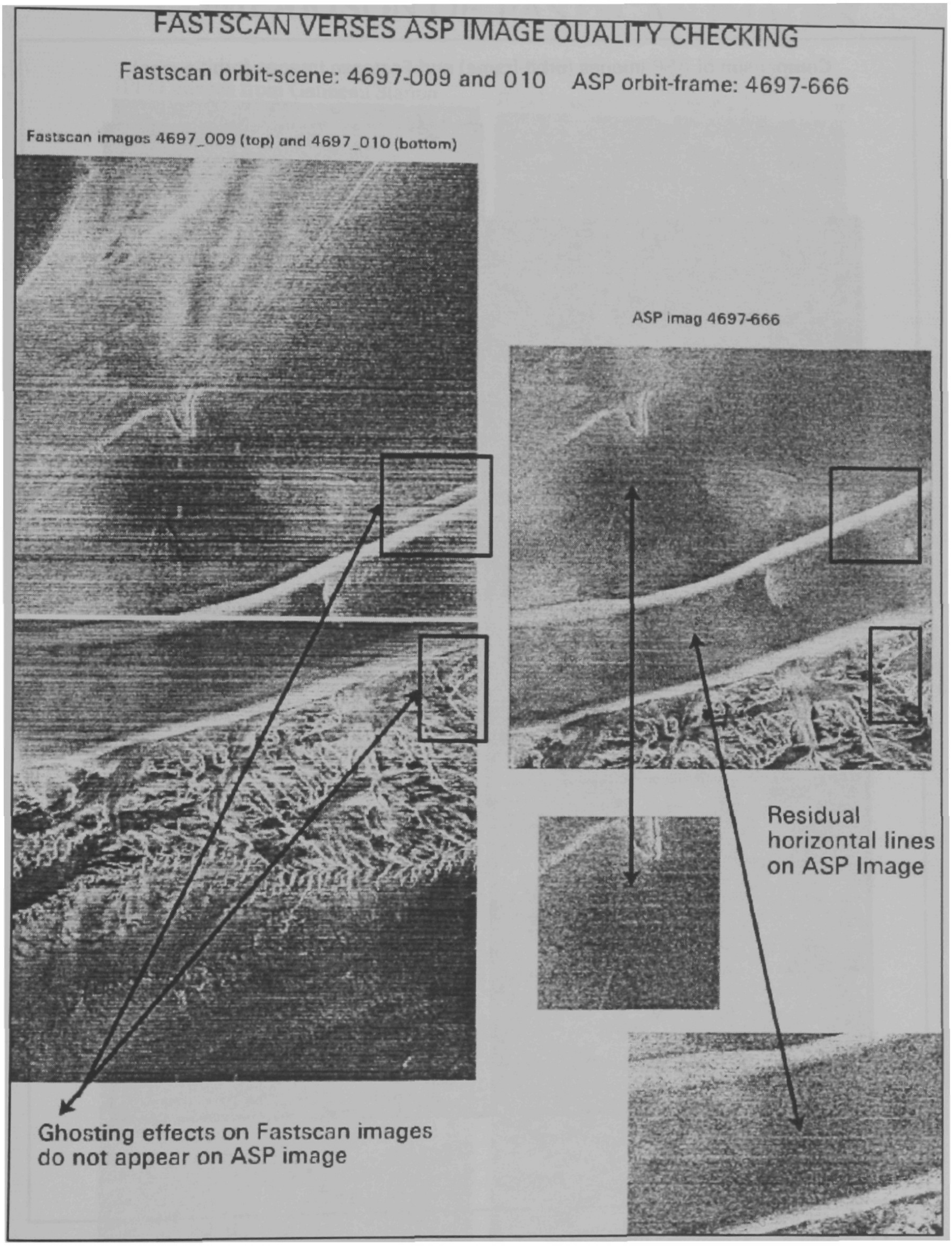


Figure 11.3. Example of horizontal line effects on fastscan products and residual lines on Alaska SAR processed (ASP) image. Notice there is no residual ghosting effects on ASP image.

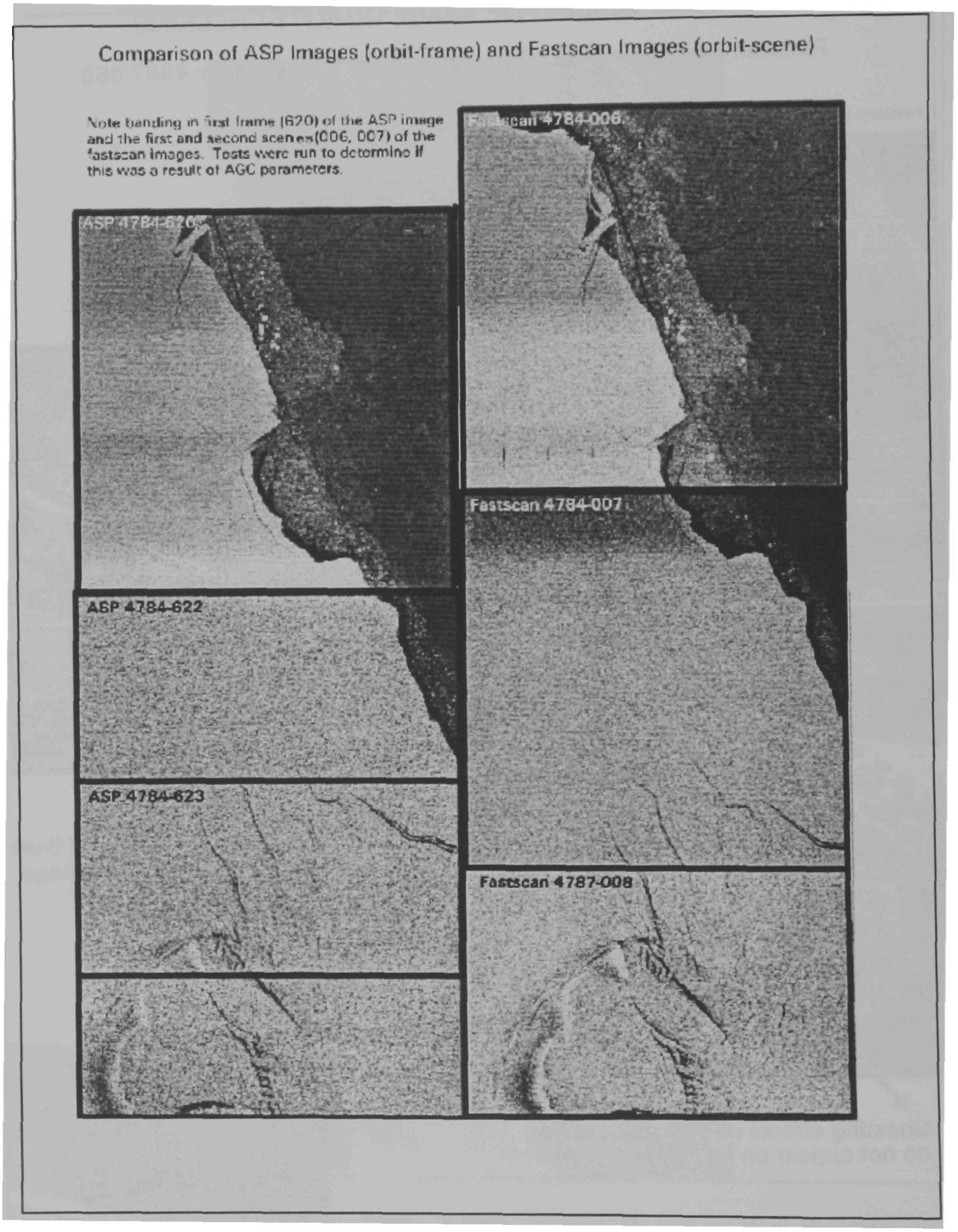


Figure 11.4. Example of banding effects on fastscan products and residual banding on Alaska SAR processed (ASP) image. Note the sharp change in brightness and the geometry of the coastline.

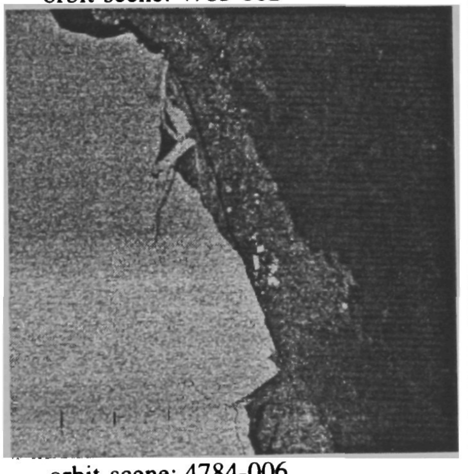
COMPARISON OF FASTSCAN IMAGES

JPEG images from Gatineau Station

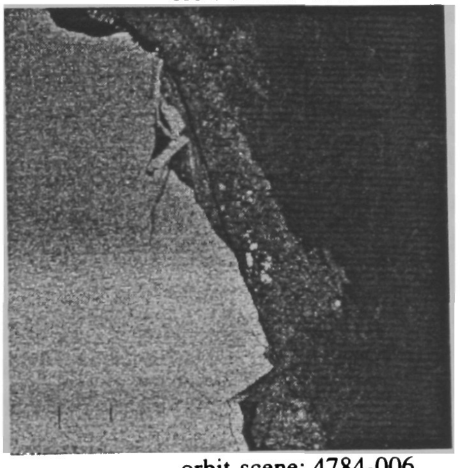
JPEG images from Prince Albert Station

orbit-scene: 4783-002

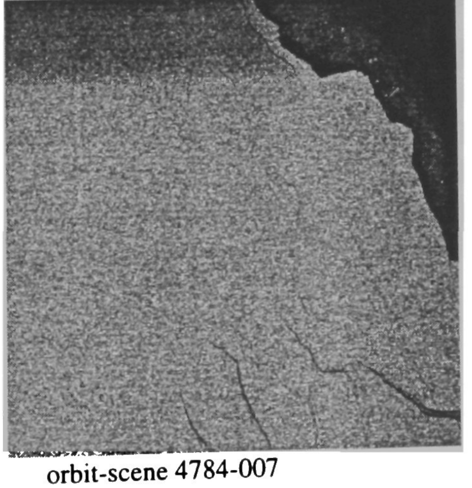
orbit-scene: 4783-002



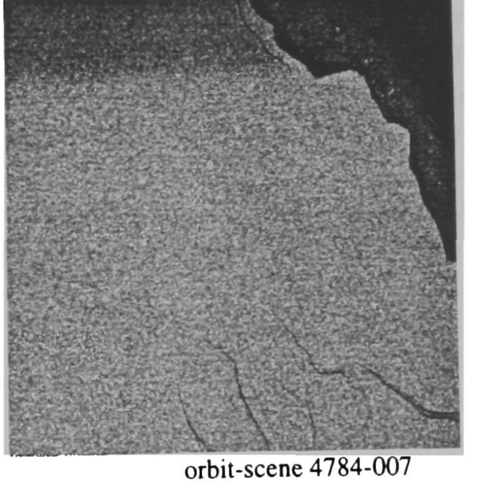
orbit-scene: 4784-006



orbit-scene: 4784-006



orbit-scene 4784-007



orbit-scene 4784-007

Figure 11.5. No difference noted in fastscan products

11.2 Automatic Gain Control vs. Fixed Gain Analysis

RADARSAT 1 (R1) is equipped with a variable attenuator in order to prevent the 4 bit A/D from saturating over areas of high backscatter. The attenuator can be set at a fixed value for the duration of a data acquisition or it can be time-variable, dependent upon the backscatter of a portion of the imaged area. The typical method of operation is to use the Automatic Gain Control (AGC). Since the AGC is selected based on the return from only about 25% of the full swath width it is conceivable that the portion used to determine the AGC setting could cause saturation or an under utilization of the 4 bits. On the other hand, if the backscatter varies considerably during the acquisition a fixed gain selection may also have the same problems.

We determined that the AGC mode is more desirable than the fixed gain mode for the Antarctic Mapping Mission (AMM). The primary reasons for this selection are the extreme and rapidly varying backscatter over many of the orbit swaths and the lack of negative consequses seen in the AGC images. The only R1 data available to us at the time of the analysis was uncalibrated therefore, our assessments are based on relative comparisons of DN. A summary of our results are present below.

11.2.1 Analysis of AGC Values

The AGC values and the relative location of their changes are contained within the Scan Results Files (SRF). AGC plots were generated for many Antarctic north-looking R1 orbits over a variety of ground conditions. An example of an entire data acquisition is shown in Figure 11.6 with the changes occurring within the coastal margin scene shown in Figure 11.7. The change of 12 dB in a single scene is common in data acquisitions at the coast and over the Antarctic Peninsula and the Trans-Antarctic Mountains. These steep gradients in backscatter are consistent with previous observations of Antarctica using ERS-1 scatterometer data by Rott et al. Based on these results it would be difficult to choose an optimal fixed gain value for the duration of a data acquisition.

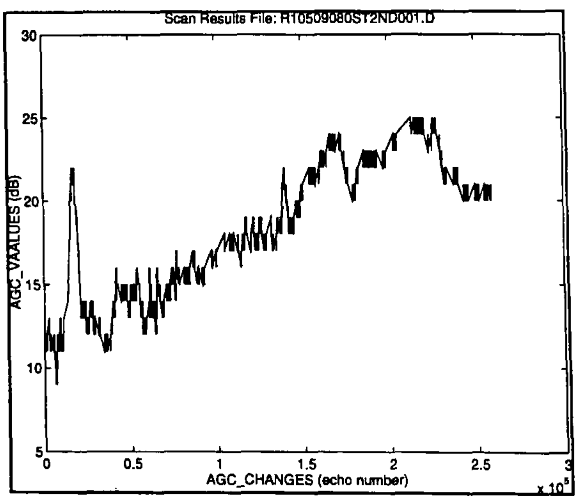


Figure 11.6. Entire data acquisition.

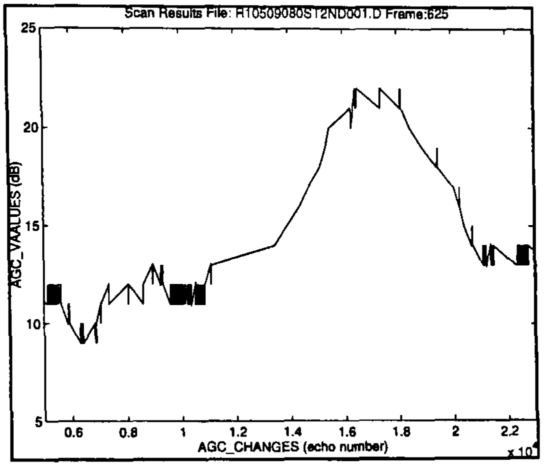


Figure 11.7. Coastal margin changes.

11.2.2 AGC/Fixed Gain Comparisons

Antarctic north-looking R1 data in both AGC and Fixed gain data were acquired over 5 test areas in order to make a qualitative assessment of the images. The location of the test areas were chosen to represent the variety of ground cover types to be encountered during the AMM. Several fixed gain orbits were used with a variety of gain settings. The interpretability of the images were compared by visual inspection and the effective use of the DN values determined with histogram analysis. There was no observable differences in the image quality between the AGC and those Fixed Gain scenes with a gain setting near the AGC selected value. The histogram analysis showed that the AGC scenes typically used a larger portion of the DN range.

11.2.3 ERS-1/RADARSAT Comparisons

A similar comparison of the image interpretability and histograms were performed with ERS-1 and AGC RADARSAT scenes of the same areas. On the Antarctic Peninsula, where the ERS-1 data were processed at 16 bits by ESA, the data were converted to 8 bit by an OSU algorithm in order to match the 8 bit format of the ASF processor. For these scenes the comparisons showed negligible differences between the scenes. ERS-1 data acquired through the McMurdo station (already in 8-bit format) used a wider range of DN values for areas of low backscatter within a scene (Figure 11.8). For relatively bright areas within the same scenes R1 with AGC had a broader histogram distribution (Figure 11.9). We closely inspected several features with small scale and subtle contrast (e.g. glacier flow lines) and found no difference in the interpretability of the ERS-1 and AGC R1 images.

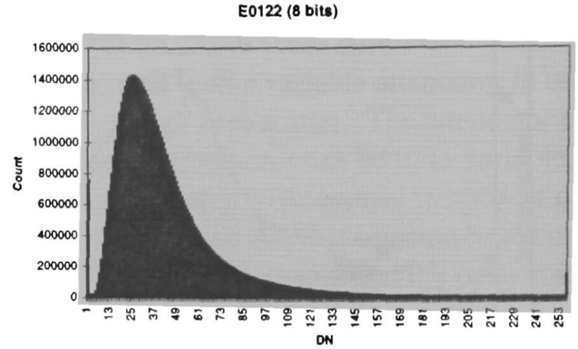


Figure 11.8. ERS-1 data distribution of Digital Numbers (DN).

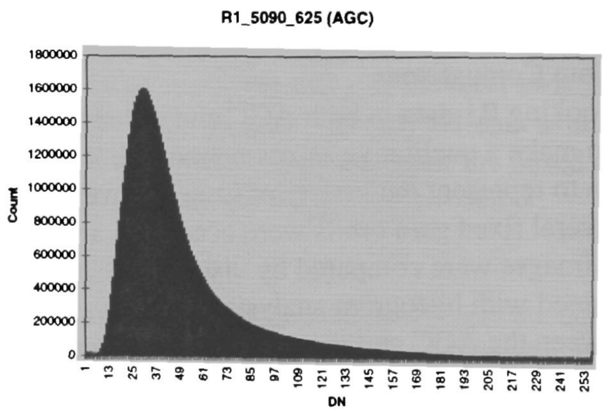


Figure 11.9. Radarsat data distribution of Digital Numbers (DN).

11.2.4 Swath Overlay on AVHRR Map

The planned AMM mapping swaths were superimposed on an AVHRR map to determine the areas of potential problems caused by swaths crossing the coast at shallow (oblique) angles. With this geometry it is possible for the narrow AGC window to be observing a low backscatter area such as the sea while a large portion of the full imaged swath contained much brighter ice shelf or land-cover. The composite map verified that a vast majority of the coastal crossings are at steep angles. The only major potential problems occur along Palmer Land and the Northern tip of Victoria Land, but the presence of sea ice during the AMM will minimize the effect.

11.3 SPA Verification

Verification of SPA and ASP (Alaska SAR Processed) four corner points was performed to determine geometric accuracy. The ASP SAR images used for this analysis were processed on the SAR processor prior to July 20, 1997. SPA data represents the predicted orbit the satellite travels and is used as an initial orbit plan for data acquisitions.

Figure 1 shows the location of two ASP SAR images and the corresponding SPA data overlain by the ADD coastline in Polar Stereographic coordinate system. The four corner points for the ASP SAR images were obtained from the leader file. The values in the middle show the overlap distance measured between the SAR images and SPA data, respectively. The values at either side show the difference in geographic position between the SAR images and SPA predicted orbit. The small triangle in the right hand side of image frame is the location of control point (Dumont 'Urville Station: 66deg 39 min 33 sec South, 140 deg 00 min 50 sec East). The crossed point (+) in the right frame is the estimated location of control point relative to the SAR frame

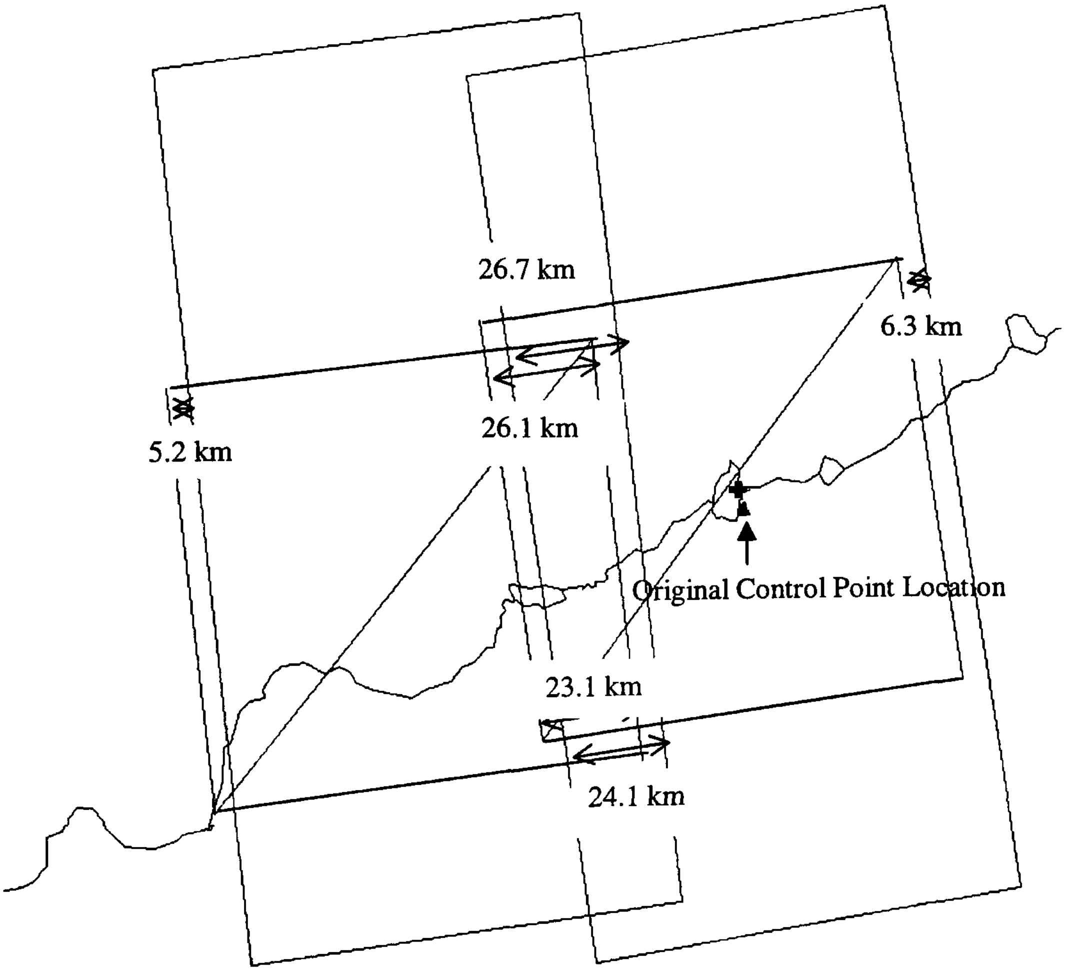


Fig 11.10. Location of SPA predicted orbit, ASP SAR image frames (corner points obtained from image leader file), and ground control point.

Figure 11.11 was created to verify the overlap extent between the leader file four corner points and the actual image data. Georectification was performed by matching like features contained in both images.

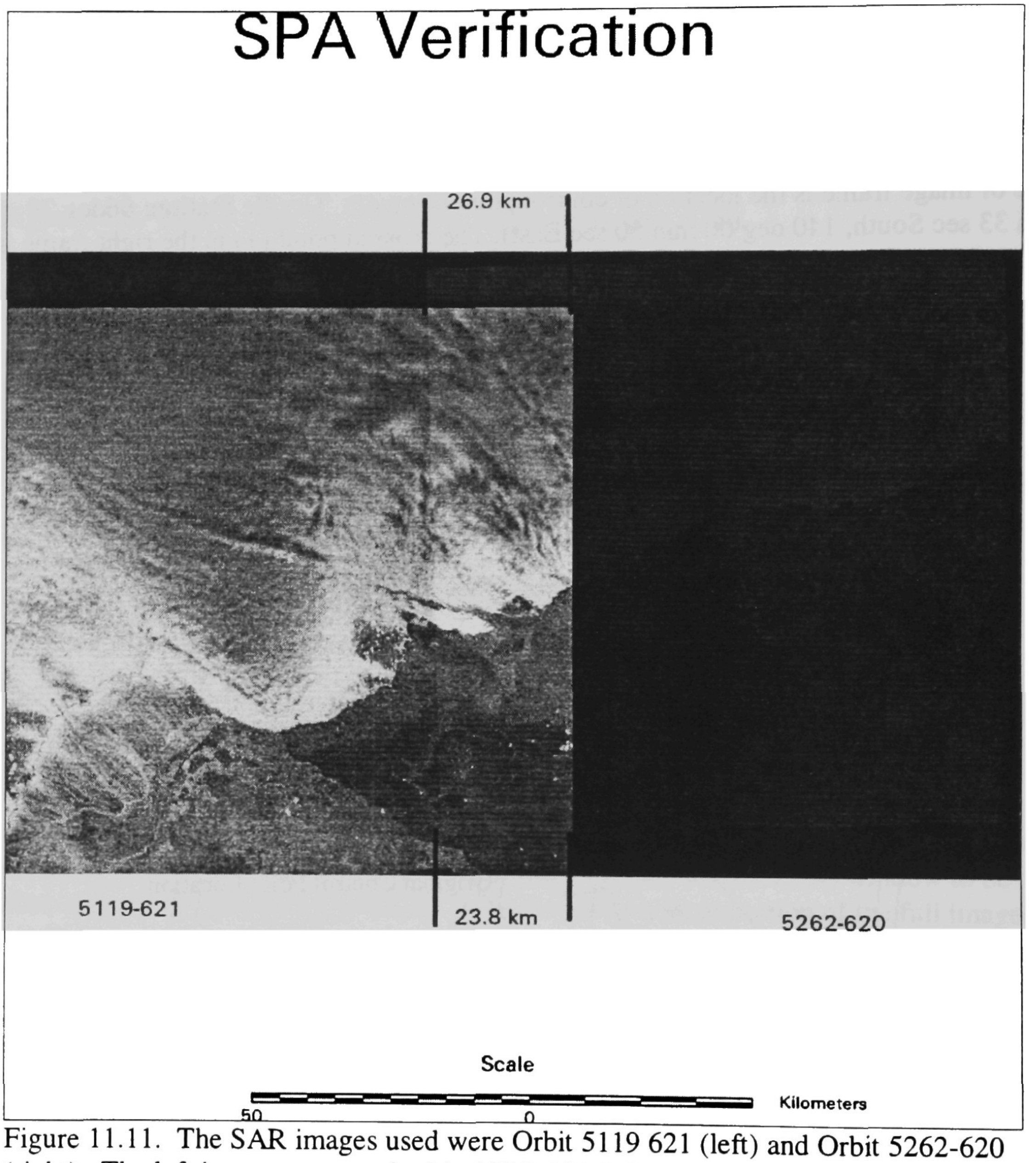


Figure 11.11. The SAR images used were Orbit 5119 621 (left) and Orbit 5262-620 (right). The left image was acquired in 1996, 301 Julian days. The right image was acquired in 1996, 311 Julian days.

11.3.1 Analysis

As shown in Figures 11.10 and 11.11, the overlap estimated for the leader file information (SAR image), the SPA, and the actual SAR images is almost same. So we assume that the random error in corner points is minimal in the range direction.

The (X,Y) image location of the ground control point (Figure 11.10) was estimated from the actual distance (in kilometers). The (X,Y) location was calculated to by (4585,4444). The observed (X,Y) position for the control point in the actual image was determined to be (4538, 4042). The difference is 47 pixels in the X-direction and 402 pixels in the Y-direction. This corresponds to a ground distance of 587 meters in the X-direction (47 pixels x 12.5 meters) and 5025 meters in the Y-direction (402 pixels x 12.5 meters). These results show that the accuracy of corner points in the leader file is about 600 meters in the range direction and 5 km in the azimuth direction.

A second approach was taken to estimate the accuracy of corner points. Using the four corner points obtained from the leader file, we geocoded the SAR images using a linear rectification scheme. No terrain correction was made to compensate for layover effects. After the geocoding using only the four corner points, we compared the measured location (in polar stereographic coordinates) of the ground control point in the geocoded SAR image to the actual location (in polar stereographic coordinates) of the ground control point).

	X (in meters)	Y (in meters)
Geocoded Image	1651445	1965134
Actual Location	1651667	1969350
Difference	222	4216

Both results show that the error of the corner points in the azimuth direction is about the same (~5 km) and is the main source of error.

11.3.2 Results

Since the error of SAR frame corner points is mainly in the azimuth direction, the difference of SAR frame and SPA prediction in X direction (shown in Figure11.10) seems to be mainly due to an error in SPA prediction. The difference is about 5 km which corresponds to 5% error (5km out of 100 km) in SPA prediction. This falls within an acceptable tolerance.

11.4 Scan Result File Accuracy Verification

Scan result files are an initial ASCII product file produced from the scanning of satellite signal data. The coordinates generated are based on the predicted orbit. The scan result files used in this analysis were processed prior to July 20, 1997.

There are three main questions concerning the accuracy of scan result file that will be addressed here:

1) What is absolute location error of scan result file?
2) Is swath width from scan result file equal to the actual image width?
3) Is azimuth direction length from scan result file equal to the actual image length?

To answer first two questions, we used the results of the SPA verification (see section 11.3) and included the four corner information obtained from the SRF files (Figure 11.12). The differences between the four corner point information obtained from the image leader file and that obtained from the scan result file in the range and azimuth directions are 1.1 km and 6 km, respectively.

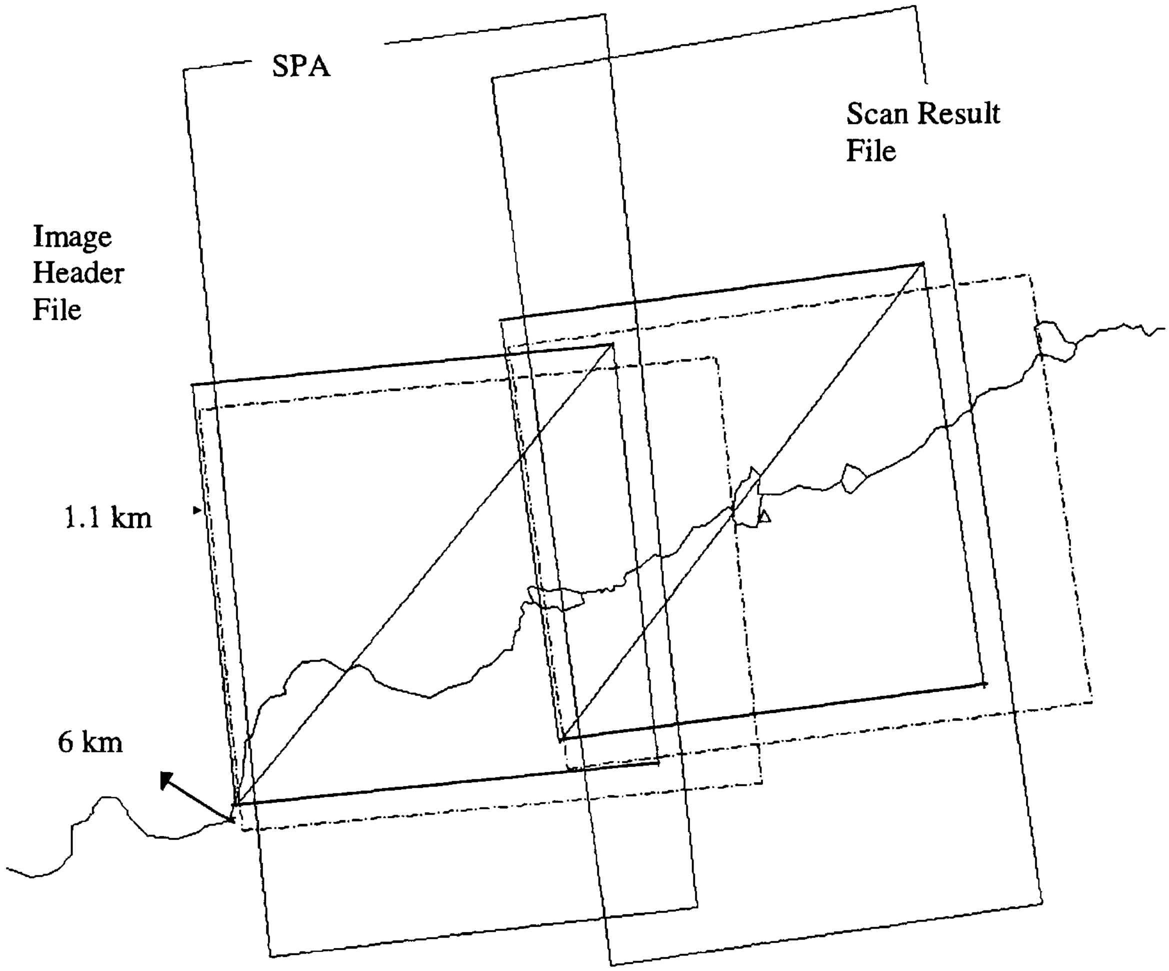


Figure 11.12. Same as figure 1 but the frame from scan result files are added (dotted rectangles).

To answer the third question, we used a tie point approach. First we plotted a portion of orbit 5040 and its frames from scan result file (see Figure 11.13). The distance of the four adjacent frames were measured to be 228.5km from the top of the first frame to the bottom the last frame. We mosaicked the corresponding SAR images together using tie points inside the overlapping areas (geocoding in relative sense) (see Figure

11.14). The assumption made was that each pixel size is 12.5 m in ground. The measured distance from four-image mosaic was about 234.4 km.

11.4.1 Results

1) The accuracy of scan result file in range direction is estimated to be about 800 m (1100 m – 300 m). The accuracy of scan result file in azimuth direction is estimated to be about 2 to 3 km.
2) As shown in Figure 11.12, the swath width is about 25 km wider than the actual image width. **This is too serious of an error !!** and is unacceptable.
3) The estimated azimuth distance from scan result file is about **5.9 km shorter** than the distance estimated from four image mosaic over four frames (1.475 km /frame).

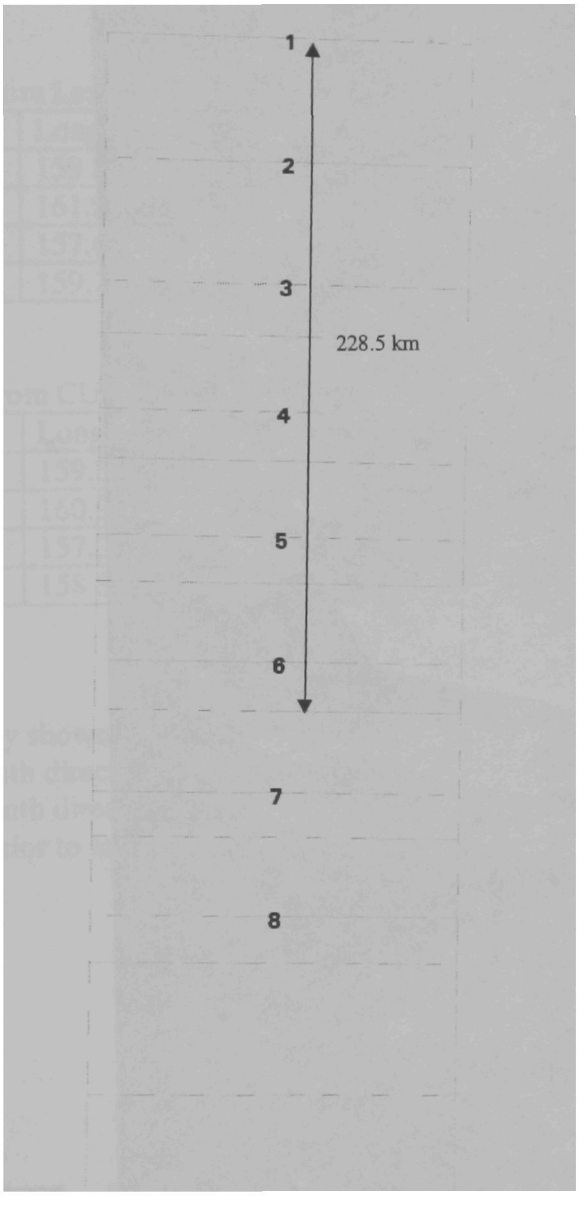


Figure 11.13. Portion of frames from orbit 5040. Measure distance (top to bottom) of four adjacent frame is about 228.5 km.

Four image mosaic from orbit 5040

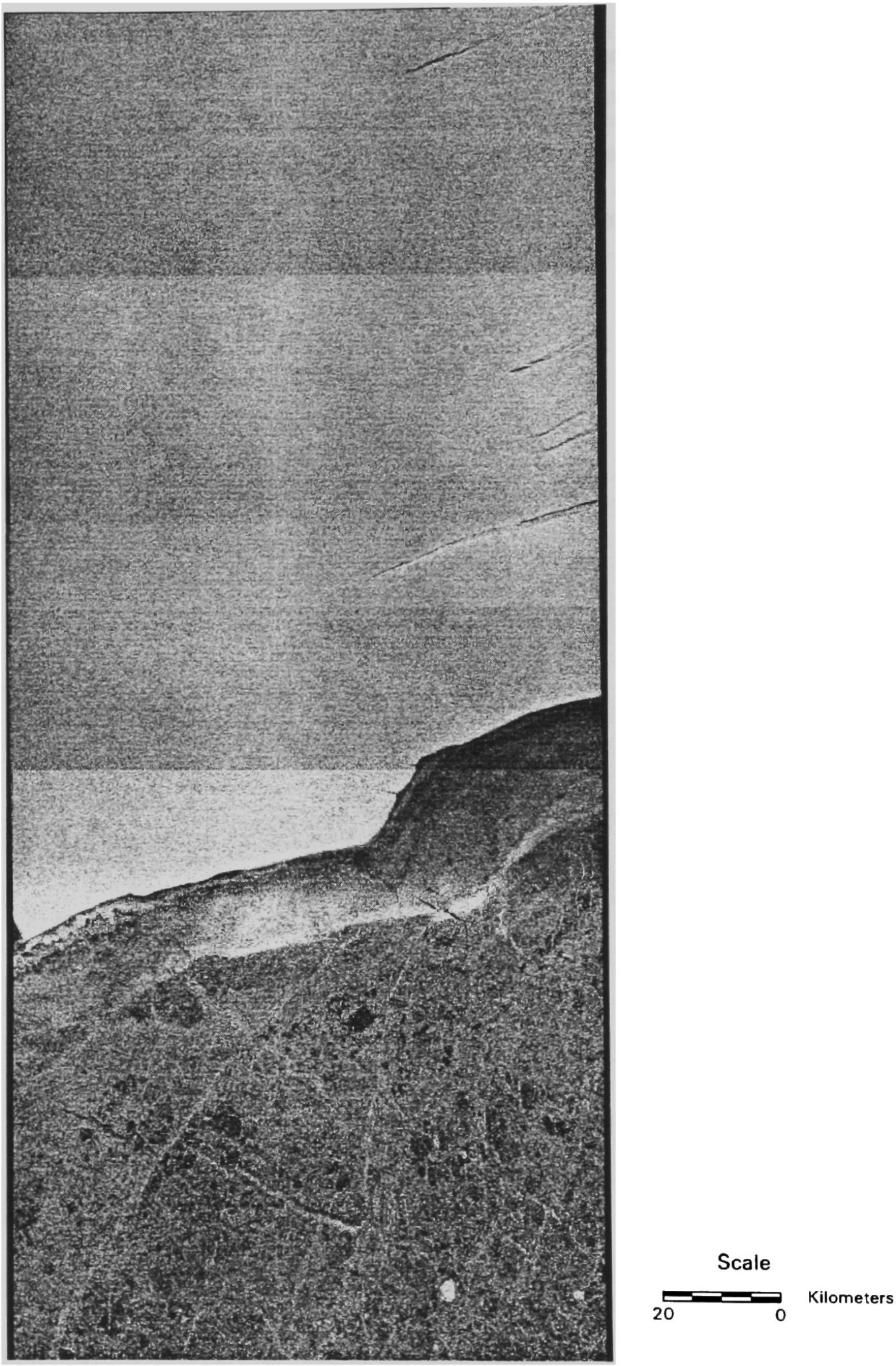


Figure 11.14. Mosaic of four frames from 5040 orbit. Frames used are 652,653,654,655.

11.5 Fastscan vs. ASF processed SAR data

To check the accuracy of fastscan .jpg file, we compared the image data (.jpg) and corresponding CUF file with ASF processed SAR data and its corresponding leader file. First we compared the coverage of the fastscan image with that of ASF processed SAR image data. The result is shown in Figure 11.15. This composite was created by using tie points in the overlapping area. The red layer (to the right) is from fastscan and blue and green layer (to the left) is from the ASF processed image. As shown in Figure 11.15 the discrepancy in azimuth direction is about 4 km and in range direction is about 6 km. Four corner points from the leader file and fastscan CUF file were obtained and compared with each other. The result is shown in Figure 11.16. The discrepancy in azimuth direction is about 8 km and in range direction is about 18 km. The following is the four corner points used for this plot.

Four corner points from Leader File 5261-630

Latitude	Longitude	X	Y
-70.4281387	159.8045197	743172.082	-2020374.362
-69.6849747	161.3800812	713962.872	-2119060.514
-69.8665466	157.6669464	841949.242	-2049515.784
-69.1421661	159.2785492	812779.563	-2148525.674

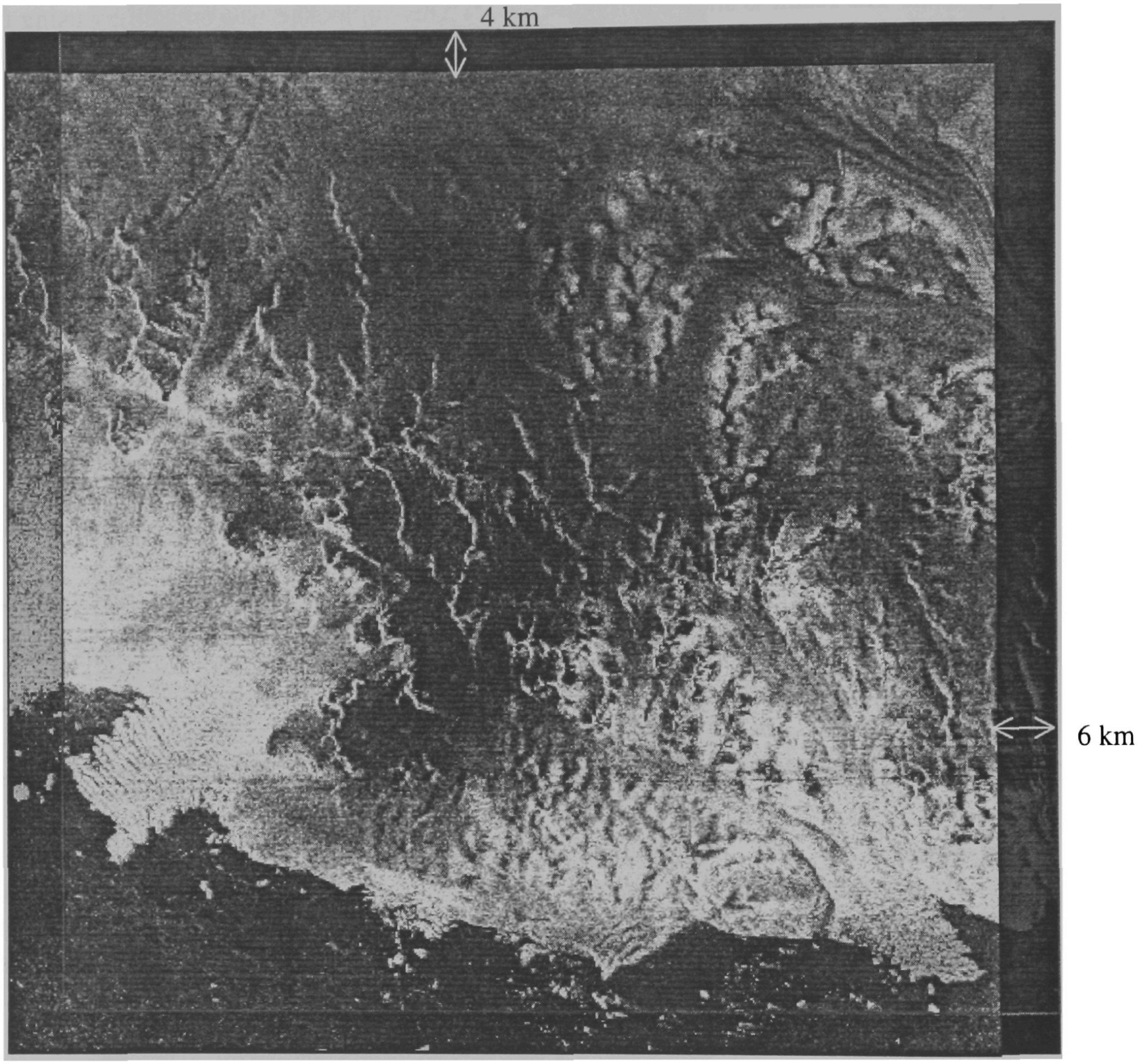
Four corner points from CUF 5261-002

Latitude	Longitude	X	Y
-70.5119444	159.3358333	756359.831	-2005440.445
-69.774444	160.9311111	727263.041	-2103904.309
-69.9436111	157.2088889	854956.378	-2034744.443
-69.2244444	158.836667	825983.733	-2133561.990

11.5.1 Results

As previously shown, the accuracy of the four corner points from the leader file is about 5 km in azimuth direction. There is an 8 km difference between the leader file and the CUF in the azimuth direction. Additional information regarding the fastscan products needs to be obtain prior to any conclusions.

Fast Scan Results Image vs. Regular Image



Scale

20 0 20 Kilometers

Figure 11.15. Comparison of fastscan image (*.jpg) and ASF processed SAR data. The orbit and frame number used were 5261 and 730, respectively.

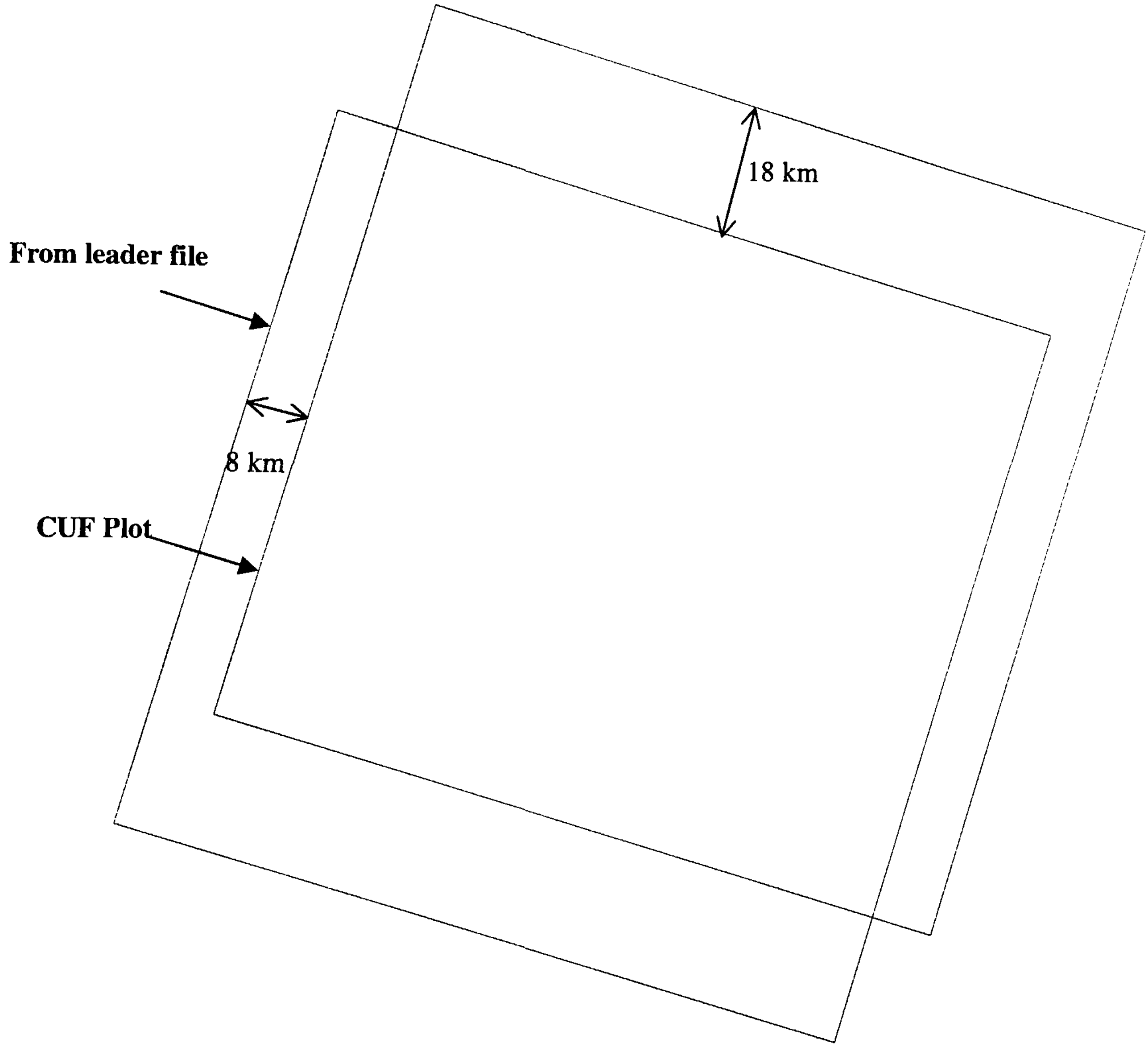


Figure 11.16. Comparison of four corner points obtained from the leader file and CUF.

11.6 New SRF and New ASP SAR image leader file comparison

Three geographic areas include Dumont 'Urville, Rothera Station, and McMurdo Station.

11.6.1 Dumont 'Urville

The orbit and frames used for this analysis are 5119-621 and 5262-620 (Dumont 'Urville). As shown in Figure 11.17, the problem of the old SRFs (processed prior to July 20, 1997) which have larger coverage in range direction has been resolved in the new SRFs. But the length in the azimuth direction is now elongated by about 17 km compared with both the old SRFs and the newly processed ASP header file (processed after July 20,1997).

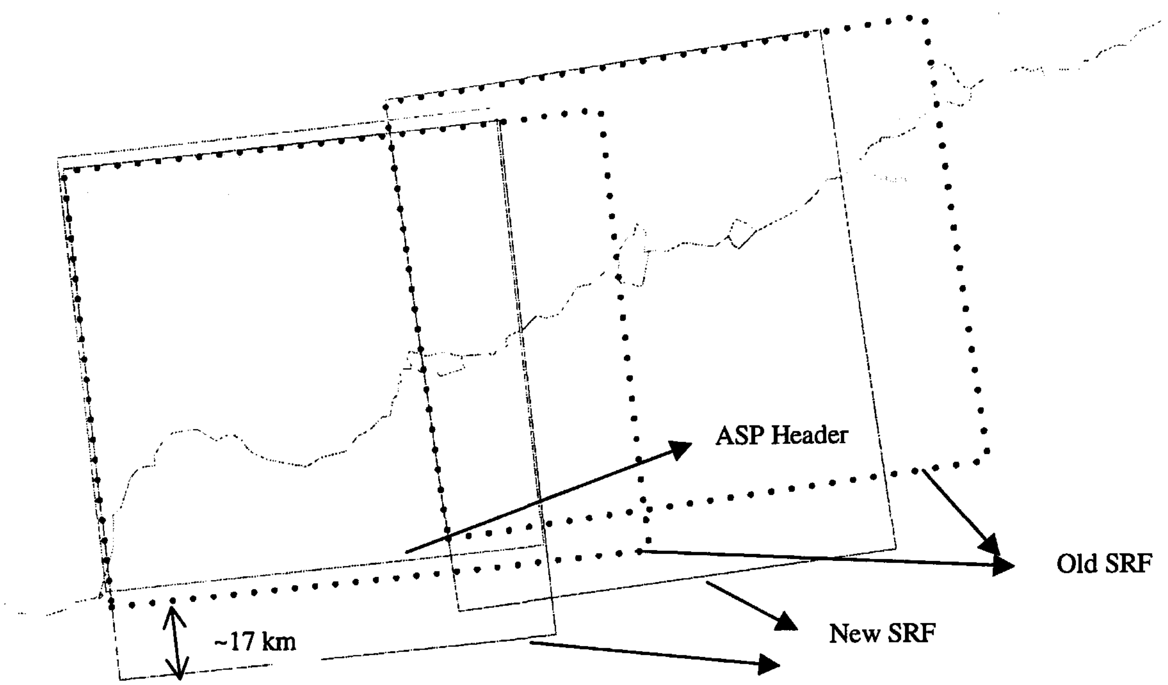


Figure 11.17. Comparison of new SRF and Old SRF. Same as Figure 3 but SPA is not shown.

11.6.2 Rothera Station

The same test was performed over Rothera Station on Adelaide Island (Orbit-frames: 5113-623 and 5213-625). The same problem is shown in Figure 11.18. The filled rectangle represents the new SRFs and the surrounding rectangles represent the four corner point coverage obtained from the ASP image leader file. There is still about a 17 km offset in azimuth direction in both frames. From Figure 11.17 and Figure 11.18 we have concluded that new SRFs are about 17 km longer coverage map than the ASP image header file information.

11.6.3 McMurdo Station

Another test was performed over the McMurdo Station on Ross Island (Orbit-frames: 5059-665 and 7816-686). The results (Figure 11.19) showed that not only was there a17 km offset in azimuth direction but about 50 km shift in the location between new SRF and image frame. **This should be noticed!!** As shown in Figure 11.19, the leader files of the two images are shifted about 50 km. The location of old SRF in relation to the image header in 5059-665 frame can not be resolved.

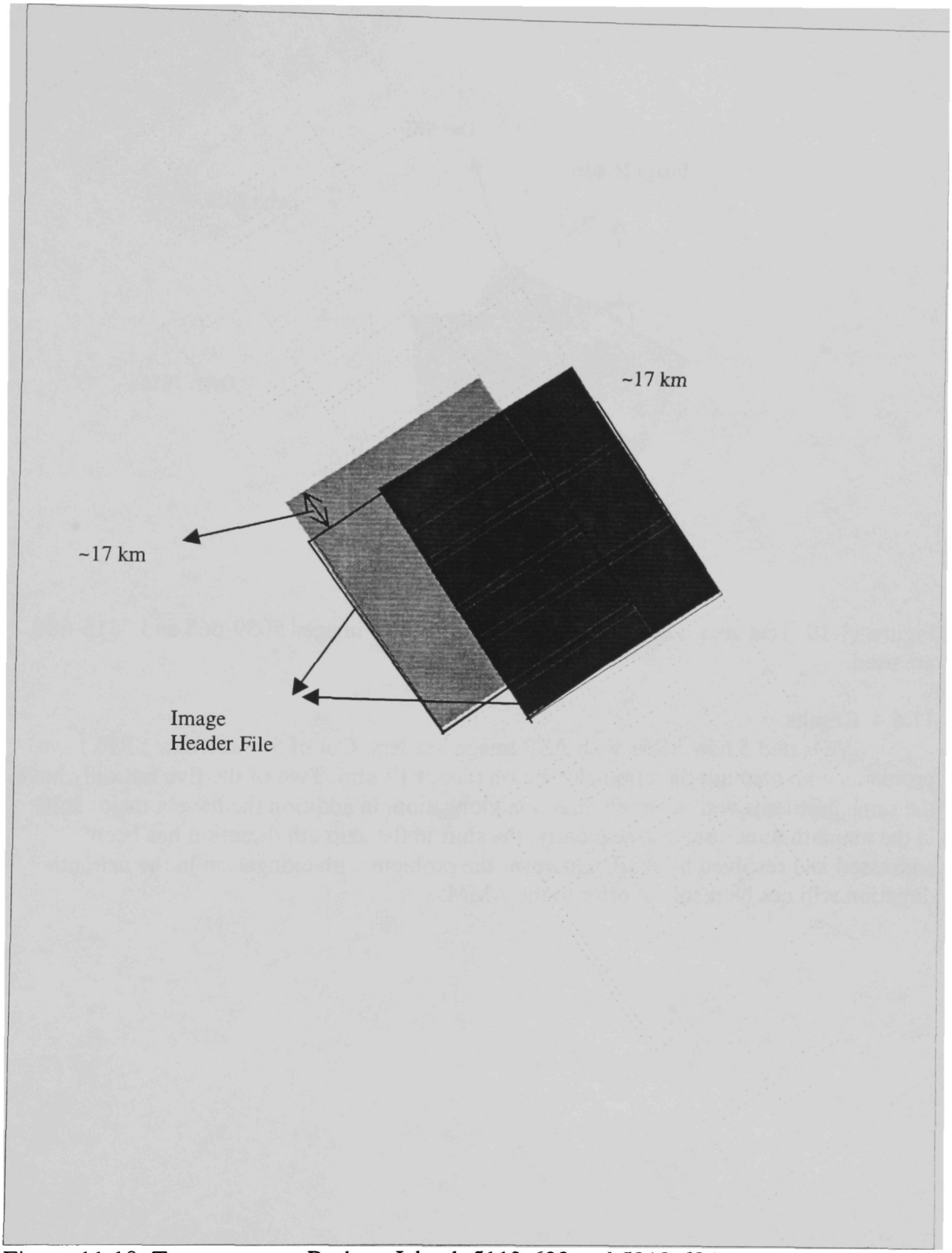


Figure 11.18. Test area over Rothera Island. 5113-623 and 5213-624 are compared with new SRF and ASP image header file.

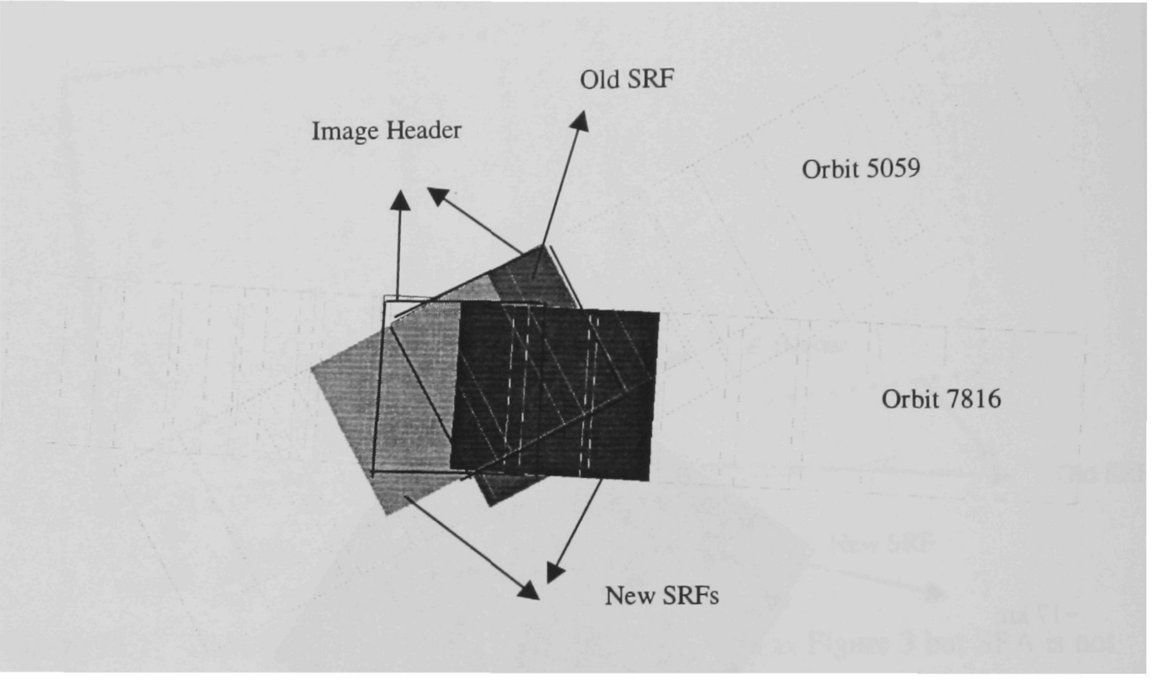


Figure 11.19. Test area is over McMurdo Station . Two images 5059-665 and 7816-686 are used.

11.6.4 Results

We tested 5 new SRFs with ASP image headers. Out of 5, three new SRFs have problems with azimuth direction elongation (about 17 km). Two of the five not only have the same problems with azimuth direction elongation, in addition the have a major shift in the azimuth direction. Subsequently, the shift in the azimuth direction has been addressed and resolved by ASF. However the problem with elongation in the azimuth direction will not be resolved prior to the AMM.